X200

Digital Video Recorder and Product Family Instruction Manual

Timespace Technology

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and Product Family
Instruction Manual

CONTENTS

SAFETY

Meets the requirements of BS EN60950 (Safety Requirements of Information Technology Equipment).

Designed to be powered from an external power source which complies with the Low Voltage Directive (73/23/EEC).

Designed for indoor use in the temperature range 5° to 40°C, 20% to 80% RH (non-condensing).

WARNING: Do not wet the product when cleaning.

WARNING: This product contains a lithium battery. Do not recharge, open, heat or dispose of in fire. Dispose of according to local regulations.

WARNING: It is important to allow enough ventilation in any surrounding enclosure so that the operating temperature range is not exceeded. Any enclosure should incorporate a fan to assist in thermal dissipation.

WARNING: The use of any power supply, other than that supplied, may cause damage to the product, and will invalidate the warranty.

ENVIRONMENTAL

Temperature

The X200 may be operated in ambient temperatures from 5 °C to 40°C. This specification applies in still air, with the X200 mounted horizontally and ambient temperature measured 15cms above the centre of X200.

If the X200 is to be mounted in an enclosure is important that the internal temperature inside the enclosure does not exceed the specification above and any new enclosure design should be tested. A simple but effective test is to place a thermocouple inside the enclosure and one outside and measure the operating temperature difference. This difference must be deducted from the X200 40°C maximum.

Example

Temperature outside enclosure	25°C	
Temperature inside enclosure	35°C	
Difference	10°C	
Maximum inside enclosure	40°C	(X200 max)
Maximum outside enclosure	30°C	(40°C-10°C)

In the above example the 40°C max spec has been de-rated to 30°C due to the effect of the enclosure.

Forced Ventilation Within Enclosures

It is advisable to include a fan integral to any enclosure design. The goal of the fan is to remove air heated by the X200 and replace it by air at the outside temperature. The temperature difference shown in the above example of 10°C can be reduced to a few degrees using a small fan. Two small fans are typically better than one due to failsafe. Fans do need checking periodically and can draw in large amounts of dirt and dust, this should be removed periodically. To reduce dirt ingress a fan may typically be run slower than rated by reducing the voltage from that specified. This can typically be done with a single resistor in series with the fan. Alternatively air filters may be used but these impede airflow and require careful system design. The X200 does not incorporate a fan but instead uses an internal switch-mode power supply to reduce power consumption (and therefore heat).

Fans offer two immediate benefits:

1   Changing the air inside the case makes the air temperature inside the case within a few degrees to that outside.

2   If the airflow is channelled around the top surface of the X200 so that air is drawn particularly over the two sides and the top, further thermal improvement is gained and an X200 specification of 5°C to 45°C may be used. (The difference between the surface X200 case temperature and ambient temperature is typically 5°C and this is the extra maximum benefit).

Low Temperatures

Insulating the X200 (e.g. inside an enclosure) and leaving it powered up (but not necessarily recording) will allow it to be used at sub zero temperatures. To offer the best performance in low and high temperature environmental conditions, an insulated case can be used with a fan, which is thermostatically controlled to switch on when the temperature rises above 10°C. The fan speed can be increased or decreased based on a thermal feedback circuit (analogue thermostat).

Shock and Vibration

Due to the nature of hard disk drives it is essential that the X200 is isolated from vibration and shock as much as possible.

Consideration should be paid to the mounting position so that the levels of shock and vibration that may be encountered are minimized.

In situations where some exposure to shock and vibration are unavoidable it is strongly advised that the T406 Anti-Vibration System is used. This system is specifically designed to isolate the X200 from structure borne shock and vibration. Further details and fitting instructions can be found in the Anti-Vibration Kit section of this manual.

EMC

The X200 complies with the relevant EEC and Automotive 'E' Mark EMC standards for this type of product.

Conformity

X200 EMC Conformity (CE Mark)

Meets the European Council Directive 89/336/EEC (EMC Directive) relating to EMC Emissions - EN61000-6-3(2001) and EMC Immunity – EN61000-6-1(2001).

X200 EMC Conformity (E Mark)

Meets the Type Approval requirements of European Commission Directive 95/54/EC

EC Declaration of Conformity   (CE)

We   Timespace Technology Ltd.
       Blackstone Rd
       Huntingdon
       PE29 6TT
       United Kingdom

declare that the

X200 Digital Video Recorder

Meets the intent of the European Council Directive 89/336/EEC referred to as the
Electromagnetic Compatibility (EMC) Directive. The product conforms to the following
standards which have been listed in the *Official Journal of the European Union*.

EMC
Emissions: EN61000-6-3(2001) EMC Generic Emission Standard for residential, commercial
and light industrial. Referring to:

> a) EN55022(1998) Conducted, Class B
> b) EN55022(1998) Radiated, Class A

Immunity: EN61000-6-1(2001) EMC Generic Immunity Standard for residential, commercial
and light industrial. Referring to:

> a) EN55024(1998) Information Technology Equipment – Immunity Characteristics
> b) IEC 61000-4-6(2003) RF Field
> c) EN60801-2(1993) Electrostatic Discharge
> d) IEC 61000-4-4 (2004) Fast Transient

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Dr ROBERT HEYLEN
TECHNICAL DIRECTOR
27th July 2004

SYSTEM OVERVIEW

X200 DIGITAL VIDEO/AUDIO RECORDING SYSTEM

| X200 DIGITAL VIDEO / AUDIO RECORDER | REMOVABLE HARD DISK CARTRIDGE | X201 REVIEWER & PROGRAMMER |

The X200 is a digital video/audio surveillance recorder for use in covert, portable and mobile applications.

Recordings are made on a removable Hard Disk Cartridge inserted in the X200. After the Hard Disk Cartridge has been removed, the recordings can be accessed by connecting the cartridge to a PC, using the USB Interface Kit, (which includes PCLink200, a proprietary reading and archiving software package).

The X201 Reviewer is used to program the menu settings on X200, to check camera views and to review recordings on the installed X200 Hard Disk Cartridge. Recording will continue during this reviewing process.

The 24-hour clock is used for all times and settings.

WARNING: The X200 Recorder must always be mounted so that there is a free flow of air around it. If it is mounted in an enclosure, it is essential that adequate ventilation is provided, and it is recommended that a fan is incorporated in the enclosure design.

WARNING: If the X200 Recorder is mounted in a vehicle, or otherwise subject to vibration, suitable damping must be built into the mounting.

WARNING: Hard Disk Cartridges are sensitive to shock, vibration and humidity.

Diagramatic Explanation of Use

RECORDING

The X200 Digital Video Recorder is used
With a removable Hard Disk Cartridge to
Record from multiple video and audio sources .

REVIEWING / CONFIGURING

The X201 Reviewer is used for on-site
reviewing of video/audio recordings and
to configure the optional menu settings
of the X200 Digital Video Recorder.

PC REVIEWING / ARCHIVING

The removable Hard Disk Cartridge
is connected to a PC (via USB Kit) to
analyse, copy or archive video/audio
recordings and to download new
operating software.

WIRELESS FILE DOWNLOAD

A Wireless Local Area Network
(WLAN) system can be used to
download recordings from the
X200 in a vehicle to a PC.

RECORDING TIME CALCULATION

The following table allows the calculation of recording time in days and other parameters shown in bold below. Fill out 5 of the 6 entries A to F and calculate the missing entry.

Number of cameras **A_____**

Number of images/sec for each camera **B_____**

Amount of motion (%)
Enter 100	Full Update Recording	
Enter 80	High Motion Cond. Refresh	
Enter 40	Bus Market Cond. Refresh	
Enter 20	Low Motion Cond. Refresh	**C_____**

Disk size in GBytes **D_____**

Amount of time in days **E_____**

Resolution (kBytes)
Enter 35	V. High	
Enter 25	High	
Enter 15	Medium	
Enter 10	Low	**F_____**

Amount of time in days $\qquad$ **E = (1157 x D) / (A x B x C x F)**

Disk size if you know the time $\qquad$ **D = A x B x C x E x F / 1157**

How much % motion $\qquad$ **C = (1157 x D) / (A x B x E xF)**

Number of images on disk $\qquad$ **(100,000,000 x D) / (C x F)**

If audio recording is enabledthen an additional 2.8 GBytes per day must be added to the total amount of disk space used.

COMPATIBILITY WITH X100 HARD DISK CARTRIDGES

Please note that the use of Hard Disk Cartridges other than those manufactured by Timespace Technology will invalidate the warranty of the X200 recorder.

The Hard Disk Cartridges that the X200 uses to store recorded footage are fully compatible with the X100 Digital Video Recorder and vice versa.

X200 Hard Disk Cartridges are supplied with the latest version of the X100 operating software already installed so that the cartridges can be used in the X100 without modification*. This operating software does not interfere with the normal operation of the X200 which stores its operating code and menu settings internally on non-volatile flash memory. Please note that the X100 stores its menu settings on the cartridge as well as the operating software, so using a new cartridge in the X100 will mean that all menu settings will revert to the factory default settings.

It is possible to record both .oba* (X100 file) and .xba (X200 file) on the same cartridge without any compatibility problems. Please note however that the X100 will only list and play back .oba files and the X200 will only list and play back .xba files.

Where loop recording is selected, the X200 records over oldest files first, whether they are .oba or .xba files. The X100 on the other hand will overwrite files in an indeterminate manner (based on their physical location on disk). Consequently if disks are to be moved from an X200 system into an X100 system please ensure that all critical files have been archived onto a PC or write protected on disk.

A cartridge which has only previously been used with an X100* can be used with the X200 without modification. The menu settings on the X200 will not be affected by using the cartridge.

Resetting the cartridge on the X200 and thus deleting all of the recording files on the disk (all .oba and .xba files will be deleted) will not affect the X100 operating software.

* Applies only to V1.5 onwards X100 Operating System.

X200 DIGITAL RECORDER

Installation

The X200 can be used free-standing or it can be mounted on a wall or bulkhead.

Power can be applied to X200 either via 12V DC jack socket (use PSU supplied with X200), or 12V screw terminals. **NB: Do not use both power inputs simultaneously.**

The Hard Disk Cartridge (supplied separately) with lock on the front in "Off" position should be inserted into receptacle in front panel of X200 and gently but firmly pushed into place, then lock switched to "On" position.

Mechanical Data

4 x threaded holes are available in the back panel of the X200 for mounting:

X200 fixing specification

four M4 threaded
bushes, max length of screw
into X200 case 15mm

dimensions in mm

204

216

126

42

hard disk end

12   88

112

X200 height excluding removable rubber feet, 47mm
X200 height including removable rubber feet, 50mm
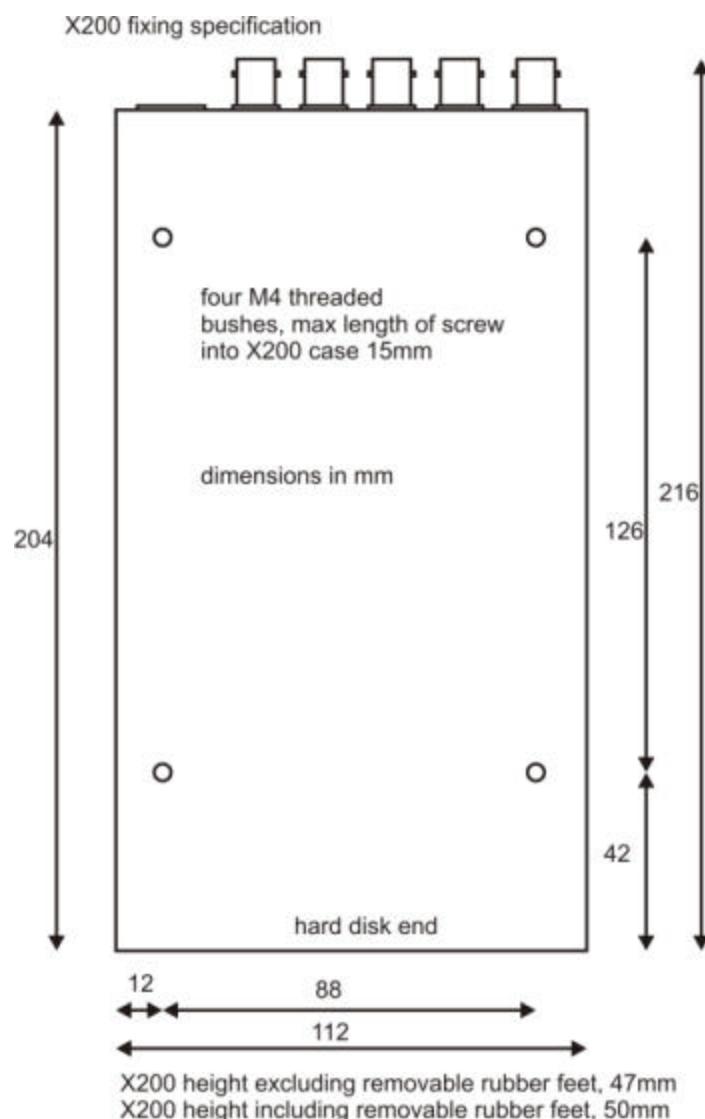
Anti-Vibration Kit

For use in mobile installations subject to shock and vibration. Please adhere to the following instructions for the installation of the Anti-Vibration Kit. Failure to do so may result in the Mounting System not working correctly.

Inventory of Parts

The Anti-Vibration Kit consists of the following parts -

QTY	Description
4	Wire Rope Mounts
1	Stabiliser Coupling
8	Zinc Plated M4 x 10mm Counter-Sunk Hex-Head Screws.

In addition you will require a standard 'L' shaped hex key. This is essential, as when all of the other screws have been tightened, there is no room for any other tool to tighten the front lower pair of screws.

Mounting Hole Preparation

Drill four mounting holes to attach the Wire Rope Mounts. If you intend to use the M4 x 10mm screws into blind holes, then the holes will have to be drilled and tapped to accept an M4 screw, with a thread depth of no less than 8mm.

If mounting the Wire Rope Mounts through a metal plate, then longer screws may have to be used in order to allow a washer and nut to be attached on the other side of the plate. The length of these screws will have to be chosen depending on the thickness of the plate and the height of the washer and nut.

Please note that any screw used for mounting the wire rope mounts to an enclosure surface must have an M4 thread and have a counter-sunk hex-head.

M4 x 8mm Threaded Hole   4mm Ø Through-Hole
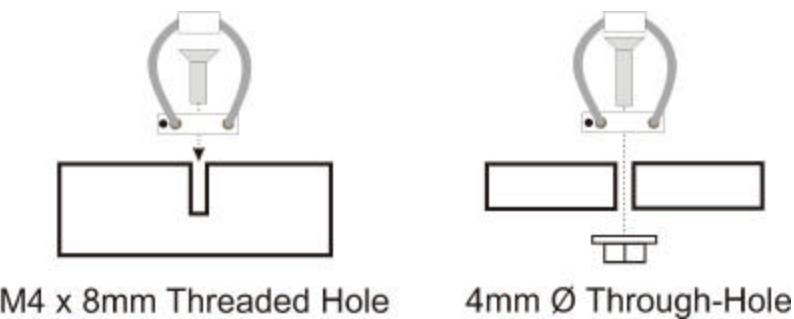
Mounting Hole Location

The mounting holes must be drilled on 126mm and 88mm centres.

Total Mounting Volume Required

It is necessary to allow a minimum clearance of at leas t 10mm around the body of the X2 00 when mounted on the T406 Anti Vibration Kit. This is to allow free movement of the X200 on the anti vibration mounts and to prevent collision with either the enclosure or peripheral systems due to vertical and lateral movement under extreme s hock and vibration conditions.
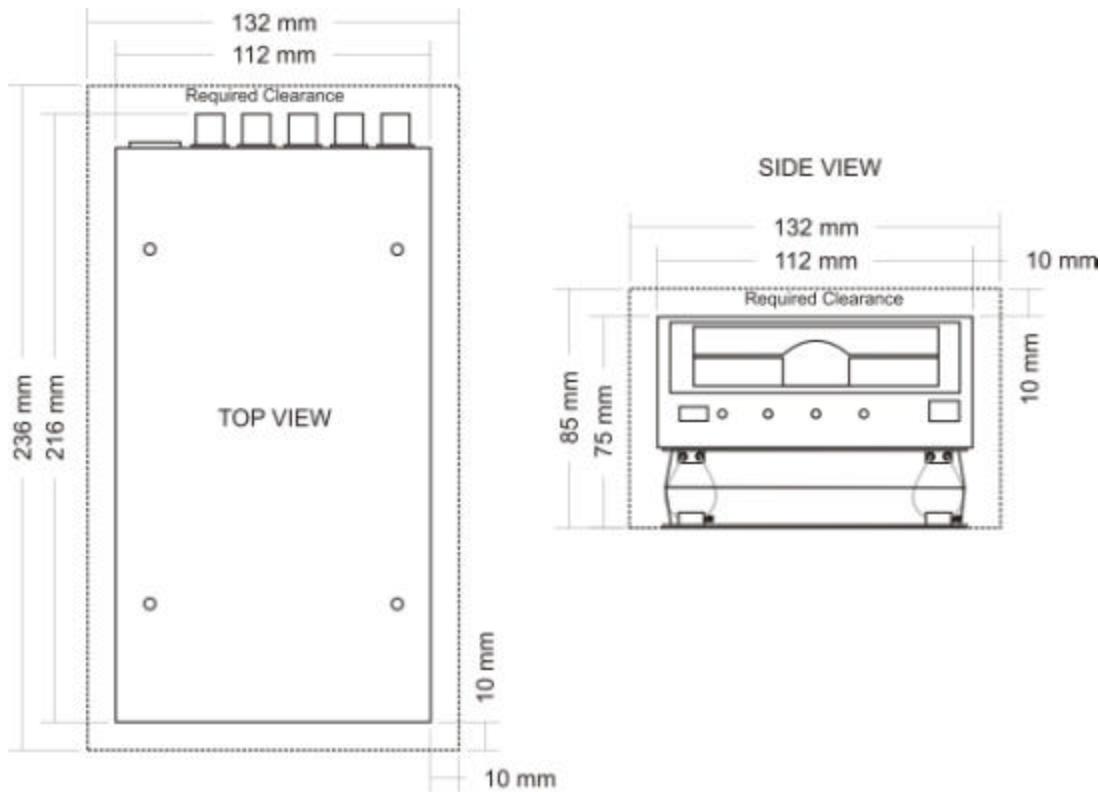
Cable Installation

Please note that when installing cables to the rear of the X200 it is important not to arrange or clamp them in such a way as to impede the free movement of the rear anti-vibration mounts.

Bad Cable Installation   Good Cable Installation
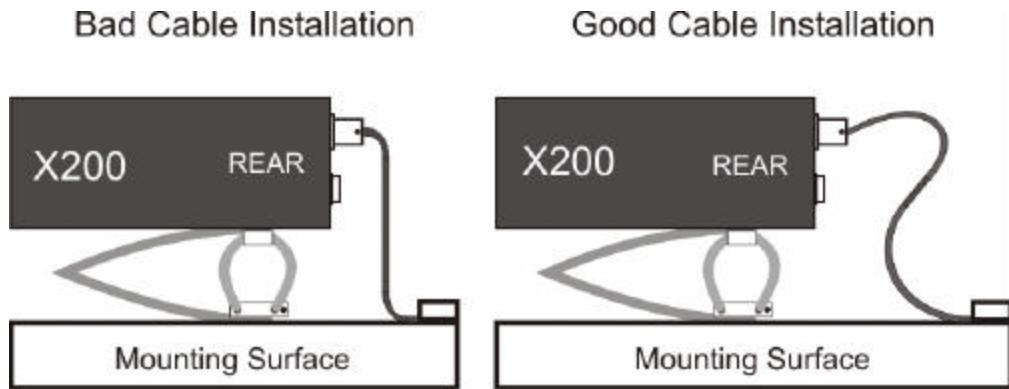
Installation Procedure

It is advised that some form of thread-lock compound should be used on the screws securing the wire rope mounts to both the X200 and mounting surface. This is in order to prevent loosening due to vibration.

1)   Attach the Wire Rope Mounts to the X200 with four of the countersunk M4 hex-head screws provided and L-shaped hex key. When attaching the rear pair of mounts please ensure that the stabilizer is 'sandwiched' between the mounts and the X200 by aligning the stabilizer holes with the mounting holes in the X200.

Please note that the 'open' end of the C-shaped plastic stabiliser should be attached to the rear wire rope mounts and face backward.

2)   Once all of the Wire Rope Mounts have been securely attached to the X200, use a pair of countersunk M4 hex-head screws to attach the bottom 'feet' of the front Wire Rope Mounts to the mounting surface/enclosure.

3)   Secure the lower 'feet' of the rear Wire Rope Mounts to the mounting surface/enclosure using the remaining pair of countersunk M4 hex-head screws and a standard L-shaped hex key. Ensure that the stabilizer is 'sandwiched' between the lower feet and the mounting surface/enclosure by screwing through the Wire Rope Mount feet, then the stabilizer and into the mounting surface/enclosure.
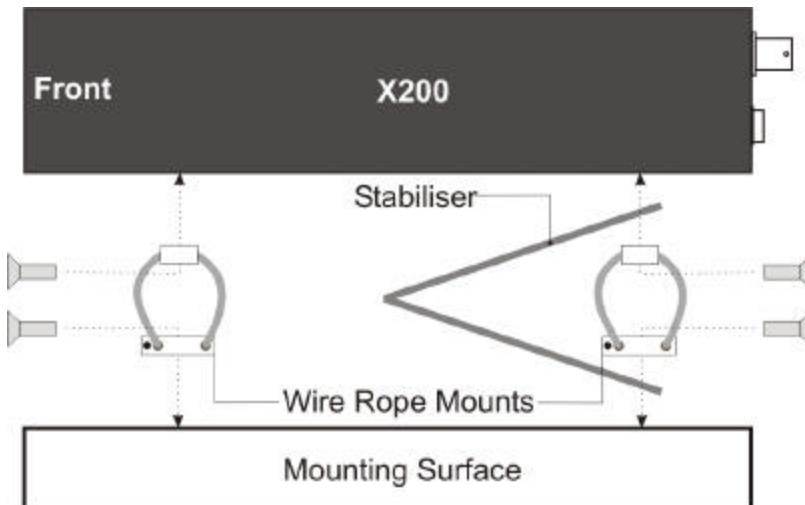
Orientation of Unit

The X200 should be mounted in the following horizontal orientation. This is strongly advised for maximum vibration and shock isolation.

Horizontal
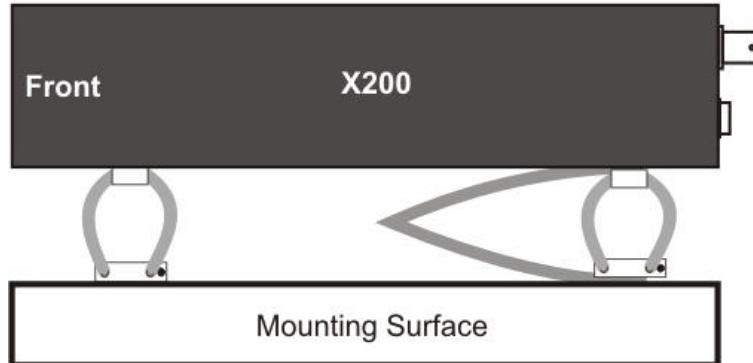
If it is not possible to mount the X200 in the horizontal orientation then the following vertical orientation may be used.

It must be noted however that this vertical orientation is not as effective at isolating the X 200 from vibration and shock as the horizontal orientation.

The position of the plastic stabiliser, screw types and assembly order remain the same for this mounting orientation.

The X200 must never be mounted by hanging it upside down from a horizontal surface when using this mounting system.

Vertical
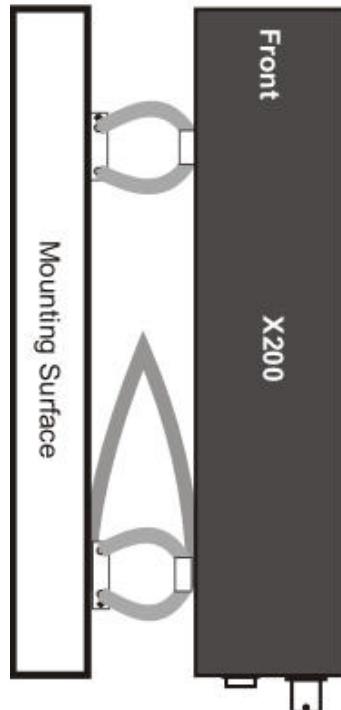
Connector Specifications and Diagrams

X200-16 Rear Panel
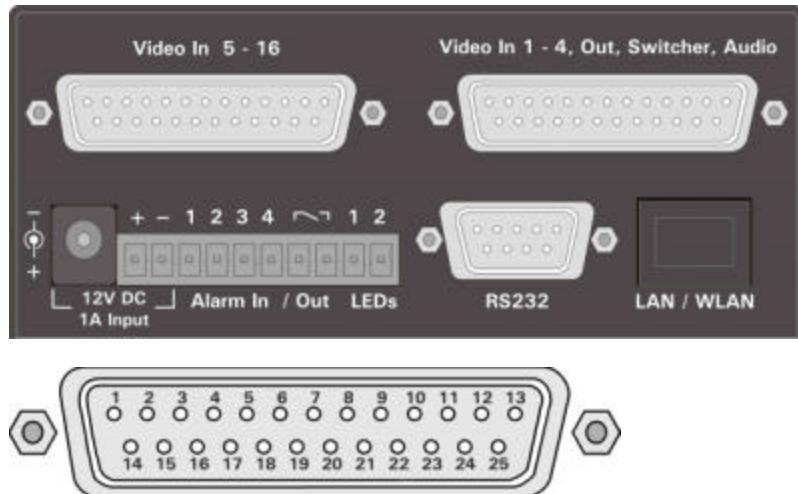
Pin numbering of both 25 Way Male D type connectors on X200 (looking at rear panel).

Video 5 - 16 Connector

Pin		Pin	
1	Video GND In 5	14	Video In 5
2	Video GND In 6	15	Video In 6
3	Video GND In 7	16	Video In 7
4	Video GND In 8	17	Video In 8
5	Video GND In 9	18	Video In 9
6	Video GND In 10	19	Video In 10
7	Video GND In 11	20	Video In 11
8	Video GND In 12	21	Video In 12
9	Video GND In 13	22	Video In 13
10	Video GND In 14	23	Video In 14
11	Video GND In 15	24	Video In 15
12	Video GND In 16	25	Video In 16
13	Not Connected		

Video 1 - 4, Out, Switcher, Audio Connector

Pin		Pin	
1	Video GND In 1	14	Video In 1
2	Video GND In 2	15	Video In 2
3	Video GND In 3	16	Video In 3
4	Video GND In 4	17	Video In 4
5	Video GND Main Out	18	Video Main Out
6	Video GND Switcher Out	19	Video Switcher Out
7	Audio GND Out 2 (right)	20	Audio Out 2 (right)
8	Audio GND Out 1 (left)	21	Audio Out 1 (left)
9	Audio GND In 1 (left)	22	Audio In 1 (left)
10	Audio GND In 2 (right)	23	Audio In 2 (right)
11	Video GND Main Out S-Video Y	24	Video Main Out S-Video Y
12	Video GND Main Out S-Video C	25	Video Main Out S-Video C
13	Not Connected		

X200-16 Cable Harness Recommended Specification

A common cable harness can be used for both 25 Way D type connections on the X200-16

Connector	25 Way Female D type
Shell	Recommended max overall width 56mm (the two 25 way connectors are 57mm apart)
Cables	12 individual RG179 cables of suitable length.

Connections		Shield pin	Core Pin
	Cable 1	1	14
	Cable 2	2	15
	Cable 3	3	16
	……………..		
	Cable 12	12	25

Pin 13 not connected.

X200-04 and X200-16 Input/Output Connector
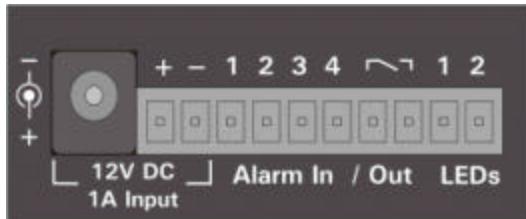
Connect power input to either + - terminals or to 2.1mm jack socket
Connect alarm inputs 1, 2, 3 and 4 to - terminal if closed, leave open circuit if open
Connect alarm output to Out terminal pair
Connect LED 1 between + and terminal LED 1, including a series resistor to limit current.
Connect LED 2 between + and terminal LED 2, including a series resistor to limit current.
Terminals LED 1 and LED 2 are high impedance (LAMP/LED off) or 0V (LAMP/LED on)

LED outputs 1 and 2 can be menu assigned to duplicate any of the 4 front panel LEDs (power, record, service and fail). Please refer to the Troubleshooting section of this manual for the operation of the Service and fail LED's.

X200-04 and X200-16 Ethernet Connector

Connect via a normal Ethernet cable (straight i.e. pins 1-1, 2-2, 3-3 etc.) to Ethernet hub, switch, router or wireless LAN adaptor.

Internal Connections: 1 Tx+, 2Tx-, 3 Rx+, 4 NC, 5 NC, 6 Rx-, 7 NC, 8 NC

X200-04 and X200-16 RS232 Connector

The X200 has a 9 way male D-type connector (DB9) which can be used to support 1 or 2 RS232 peripherals.

Conventional Cable

Using a conventional cable (DB9 male to DB9 female straight through (1-1, 2-2, 3-3 etc.)) the X200 can be connected to a modem:

Pins on the X200

Pin			→ X200 output ← X200 input	
3	TD	Transmit Data	→	Serial Data (0 = 10V, 1 = -10V)
2	RD	Receive Data	←	Serial Data (0 = 10V, 1 = -10V)
7	RTS	Request to send	→	Handshaking (please send signal = 10V)
8	CTS	Clear to send	←	Handshaking (please send signal = 10V)
4	DTR	Data terminal ready	→	X200 outputs 5V (data terminal is ready)
6	DSR	Data set ready	←	Ignored by X200
1	DCD	Data carrier detect	←	Used to detect that modem is on air (=10V)
9	RI	Ring Indicator	←	Ignored by X200
5	GND	Ground		

Proprietary Dual RS232 Device Cable

This supports the connection of two RS232 peripherals such as GSM modem and GPS (Global Positioning System).

RS232 port 1 (Modem)

Pin			→ X200 output ← X200 input	
3	TD	Transmit Data	→	Serial Data
2	RD	Receive Data	←	Serial Data
7	RTS	Request to send	→	Handshaking
8	CTS	Clear to send	←	Handshaking
1	DCD	Data carrier detect	←	Used to detect that modem is on air (10V)
5	GND	Ground		

4	5V	Power supply for GPS unit (500mA max)	
6	Ignored	by X200	←
9	R D	Receive Data	←	Serial Data
5	GND	Ground	

X200-04 Rear Panel

1 BNC video output
4 BNC video inputs

Audio Connector

5 pin 180° female DIN connector (DIN 41524)
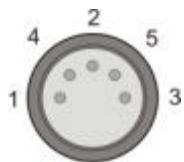
Pin
1   Audio input 1 (left)
4   Audio input 2 (right)
2   Audio GND
5   Audio output 2 (right)
3   Audio output 1 (left)

The audio signals are at line level

A 5 pin DIN to 4 way RCA phono harness can be readily purchased from a number of suppliers. Suggested search via www.google.com for "5 pin din to rca phono audio".

X200 Front Panel
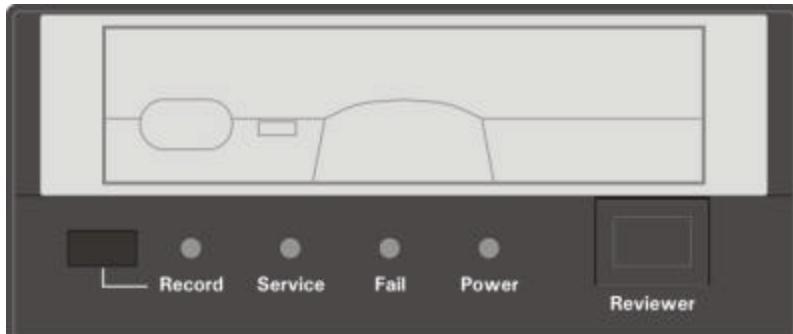
Record Button

Turns Normal recording on and off. Can be menu disabled.

LED Indicators

Record LED
Illuminated when the X200 unit is recording.

Service LED
Not currently used.

Fail LED
Illuminated when the X200 video recorder is unable to make recordings. Check that the hard drive cartridge is properly inserted and locked in.

Power LED
Illuminated constantly while power is supplied to the X200.

At Power On
All four LED's will illuminate whilst the X200 initialises and will remain lit during system check (menu disabled) until the unit is operational. Once operational only the Power LED will remain illuminated unless recording is taking place.

At System Reboot
If the Hard Disk Cartridge is switched off and then on (or replaced) or the Load System Upgrade has been performed the X200 will reboot. In this case as per at power on all four LED's will illuminate whilst the X200 initialises and will remain lit during system check (menu disabled) until the unit is operational. Once operational only the Power LED will remain illuminated unless recording is taking place.

Reviewer Connector

Connect X101 or X201 reviewer to X200 using this socket. Signals for this connector are as follows:

1 Video out
2 Video ground
3 Audio ground
4 RS232 Rx
5 RS232 Tx
6 Audio out (line level)
7 Power ground
8 12V

Programming

The configuration of the X200 is by the menu system, this is accessed using the X201 Reviewer. Please refer to the section on the X201 Reviewer for details of its use.

Connect Data Link Cable (supplied with X201 Reviewer) from socket marked "Reviewer" on X200 to socket marked "Recorder" on X201. This connection will provide power and video to X201 from X200.

To enter Menu System press any of the four MENU arrow buttons. To exit the Menu System or to move back up a level press the MENU EXIT button.

Help Screens

Throughout the menu system, every item that the cursor points to has a Help screen. Place the cursor on the line requiring explanation and press the HELP key on the X201 front panel. Use any key to cycle through the screens for that line.

Help screens are available for each menu heading and for all items contained within the menu.

The help system is very comprehensive and it is strongly recommended as a reference to both new and experienced users.

Software Updates

Occasionally software improvements are made to X200 and a new version of software is made available. The software takes the form of a .xos file. Follow these steps to install new software:

Go to OTHER MENU > ADVANCED MENU in the X200 menu system.

- **LOAD SYSTEM UPGRADE –** This loads a new version of the X200 operating system from the Hard Disk Cartridge.

  Delete all recordings on the Hard Disk Cartridge using the reset menu.
  Using the USB Interface Kit copy the new .xos file from the PC to the Hard Disk Cartridge.
  Insert the Hard Disk Cartridge into the X200 and run LOAD SYSTEM UPGRADE by pressing the right menu button.

  Check the software version in the statistics menu to verify the new version has been loaded.

The current software and menu settings on an X200 can also be saved as a .xos file. This can then be used to transfer the software version and menu settings to another X200.

- **SAVE SYSTEM UPGRADE –** This saves the X200 operating system, current menu settings and log information to the Hard Disk Cartridge.

  The cartridge can then be used as a master to set up another X200 with the same software version and menu settings. Use LOAD SYSTEM UPGRADE on the other X200 with the master cartridge inserted.

File System

The X200 uses a proprietary file type with the file extension .xba

Images from multiple cameras along with audio, GPS and other data are stored in these files. The images are compressed using MPEG2 data compression in either non-predictive (full update) mode or predictive (conditional refresh) mode. For security and optimisation reasons .xba files can only be viewed on a PC using the proprietary PCLink200 software.

For most applications there are two types of normal recording available, loop and single pass.

Loop Recording

By selecting LOOP RECORD from the RECORDING MODE option in the file system menu.

```
            FILE    SYSTEM

   RECORDING MODE : >LOOP RECORD
```
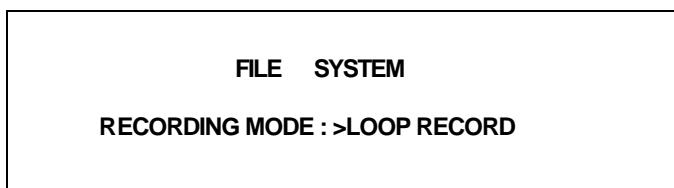
This will set the X200 to automatically delete oldest recordings first when the Hard Disk Cartridge is full (with the exception of write-protected files). The record position is stored and any playback will not affect the current record position (this is in contrast to a VHS tape).

Write-protection can be used to keep Alarm recordings but loop the background (Normal) recording.

Single Pass Recording

By selecting SINGLE PASS from the RECORDING MODE option in the file system menu.

```
            FILE    SYSTEM

   RECORDING MODE : >SINGLE PASS
```
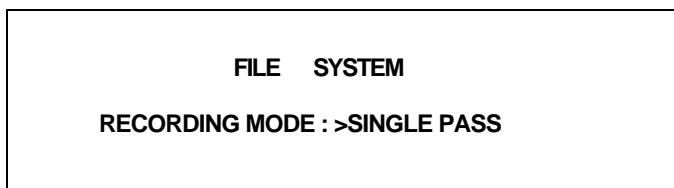
The X200 records until the Hard Disk Cartridge is full and then stops. Recordings may be deleted in the RESET menu or loop recording enabled so that the oldest files will be overwritten first.

Transferring Images to Video Tape

It is possible to transfer recorded footage from an X200 to a video recorder.

Connections

X200-04
The X200 composite video out BNC connector marked 'Video Out' on the rear panel of the X200-04 is connected to the video recorders BNC composite video input using a BNC-BNC lead. If the video recorder does not have a BNC connector for video input then it is possible to use a suitable adaptor (for example BNC to RCA) as long as the video recorder input is of a composite video type.

X200-16
The 'Video Main Out' and 'Video GND Main Out' on the 25 way male D-type connector on the rear panel of the X200-16 are connected to the signal and GND connections of the composite video input of the video recorder with an appropriate lead.

Recording

Connect the X200 video out to the video recorders video input using a suitable lead. Insert a suitable tape into the video recorder and rewind / fast forward until it is in the desired recording position.

Using an X201 reviewer select the file to be transferred from the X200 by using the files menu. Scroll through the file list until the required file is found and then press the right menu button next to the file so that it appears on the screen of the X201 Reviewer.

Once selected, the footage will automatically begin to play, press the stop button immediately to avoid missing the first part of the footage. The footage may be rewound if necessary using the rewind control on the X201 (please refer to the chapter on the X201 Reviewer for specific details on playback controls). If a different camera view is required then this can be selected by pressing the appropriate number key on the X201 Reviewer relating to the camera input number on the X200.

When ready press record on the video recorder and then press play on the X201 Reviewer to restart the footage from the X200. The selected camera view from the file should now be seen playing on the X201.

When the file has been recorded press stop on the video recorder and on the X201 reviewer.

Video Compression

The X200 records images, audio, GPS and other data into 10 minute or 1 hour proprietary format files ending with the .xba file extension. A trade-off between image quality and file size can be made by selecting from the four levels of video quality: low, medium, high and v. high. The low setting uses greater compression than the high settings and consequently less disk space is used.

As image quality rises however so does the resultant file size so a decision will have to be made as to the level of image quality needed and the length of recording required to be stored on any given size of Hard Disk Cartridge.

Non-predictive compression (full update)

In the Advanced Menu the user can select between two compression styles. The first, "Full Update Recording" means that a full image is stored every time. Each image stands alone in its own right and uses no prediction from previous images – the recording type is termed non-predictive. The advantage of full update recording is that each image is independent and free from any inter-image distortion. The images can also be searched easily during playback. The disadvantage is that no use is made of any similarity between successive images and the compression performance can be up to 5 times worse (but typically 3 times worse) than conditional refresh recording.

Predictive Compression (conditional refresh)

With conditional refresh recording the X200 stores a full image followed by a sequence of partial images for each camera. When the file is searched, the full image (known as the keyframe) is used as a starting point for playback. The X200 uses a powerful algorithm that detects motion and for each partial image, only updates areas of the image that require it. Partial images may be 1/10th the size of the full images when there is little motion in a scene. There is no cumulative error (which can occur in some MPEG implementations) and the difference between full update recording and conditional refresh recording is designed to be imperceptible. The advantage of conditional refresh recording over full update recording is the compression performance is superior (typically 3 times).

The system defaults to using conditional refresh for normal and timer recording and full update for shot and alarm recording.

Audio

The X200 has two line-level audio input and output channels. Connection to the X200 is via a 5 pin 180° female DIN connector (DIN 41524) on the rear panel of the X200 which is detailed in the Connector Specifications section of this manual.

The two input channels can be assigned to all cameras or a single camera in order to associate recorded sound with the appropriate cameras and images for a particular installation.

The audio channels can be played back individually or together when viewing footage in PCLink200 PC software. They can also be disabled during playback.

The X201 Reviewer can also be used for audio playback through its built in speaker. The audio signal is carried to the reviewer via the RJ45 reviewer cable, no other connections are necessary. It must be noted that at present playback via the X201 is in mono via channel 1 only.

The audio inputs on the X200 Recorder are line-level. Therefore some microphones will require the use of a dedicated preamplifier in order to raise their very low levels of output to line-level. The X200 is configurable so that the line-level input range can be set from 0.12 – 2.0Vrms.

For detailed information on configuring the audio settings in the X200 please refer to the Audio Recording Menu in the Menu System section of this manual.

2 Channel audio recording with 2 microphones and a pre-amplifier.
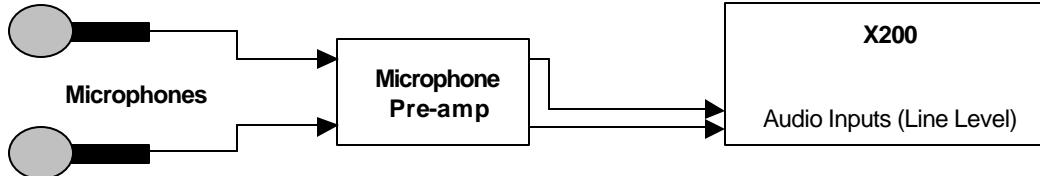
PC Access Precautions

It is important to understand that the X200 file system is a <u>subset</u> of the PC FAT32 file system. The PC will access the X200 disk cartridges with no problems but the X200 will not be able to read every FAT32 file system written by the PC.

Permitted on a PC
Reading the .xba files
Modifying the write-protect status of files
Performing disk utilities that read the disk (e.g. Scandisk) but do not modify disk

Not Permitted on a PC
All write accesses to the disk if it is to be reused in an X200. These include:

Formatting the disk on PC
Defragmenting the disk
Deleting files
Renaming files
Generating new files
Creating a recycle bin on the disk

Watermark

The X200 uses a fragile watermark. Any modification to the image data e.g. changing faces, lighting, contrast or other modifications will destroy the watermark. The image data that makes up the image set is passed though a function that generates a "magic number" or hash code from the images. The terms hash code and watermark are synonymous. A hash code is created automatically by the X200 for each image set and is then highly encrypted and stored in the information block.

The hash code can be de-encrypted and regenerated by passing the image data back though the function (i.e. in a watermark checking program). If the hash code thus obtained matches the hash code stored in the information block, the image data has not been altered or modified in any way. The watermark is "destroyed" when the hash code stored in the information block and the hash code of the data do not match.

The Menu System

The menu system is used to configure the X200 and gives control over recording resolution, camera sequencing, timer settings, alarm triggering and alarm triggered recording. There is also access to monitor options and password functions along with many other parameters.

A menu can contain the following types of entry:

- Sub-menu heading - press the right arrow menu key and the sub-menu is entered.
- Function - press the right arrow menu key and the function is performed (e.g. Reset System).
- Selection - press the left and right menu keys to cycle through the choices.
- Numeric item - input numbers 0 to 9 on the keypad (e.g. entering a time) and use the DEL button to correct mistakes.

Any changes made to the menu system have immediate effect on the operation of the system. The menu is stored on non-volatile Flash memory inside the X200. To revert to the factory settings run a RESET MENU TO THE FACTORY DEFAULT STATE WITH: ENGLISH LANGUAGE function in the RESET SYSTEM menu.

Help Screens

Every menu and every item within the menu has a separate help screen.   Place the cursor against the chosen item and press the HELP key. Where multiple pages of help a re available, move from one to the next by pressing the HELP key. Use the MENU EXIT key at any time to leave the help menu.

Menu Navigation

The menu system on the X200 can be accessed by using the X201 R eviewer. Connect the dedicated 8 way (Ethernet style) cable (supplied with X201) to the recorder and consult the instructions for X201 Reviewer.
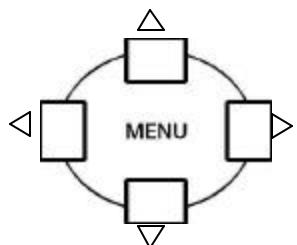
Press any of the 4 menu buttons to enter the main menu. Once in the menu system, their function is as follows:

△   Move arrow cursor up to the next item.

▽   Move arrow cursor down to the next item.

◁   If the arrow cursor is currently at a menu selection,
(e.g. **RESOLUTION: > HIGH**),
pressing the left button will cycle the value backwards,
(e.g. to **RESOLUTION: > MEDIUM**),

▷   If the arrow cursor is currently at a menu selection
(e.g. **RESOLUTION: > LOW**),
pressing the right button will cycle the value forwards,
(e.g. to **RESOLUTION: > MEDIUM**).

                    If the arrow cursor is currently at a sub-menu title
(e.g. **> OTHER OPTIONS**).
pressing the right button will enter this sub-menu.

The **MENU EXIT** key on the X201 R eviewer will exit the current menu and move up 1 level in the menu system when pressed. If already at the top level of the menu pressing this key will exit the menu system completely and return to the video switcher.

If the left and right menu keys have no effect, then numerical entry using keys 0 to 9 is required.

The **SEARCH** key on the X201 Reviewer accesses a menu allowing the user to go to a specific time and date in the recorded footage. Pressing this button will enter the **PLAYBACK SEARCH** screen as seen below. If the footage on a given camera cannot be found (it may not have been recorded), a "**NO FOOTAGE FOR SELECTED CAMERA**" message will be displayed.

```
        PLAYBACK SEARCH

TIME :          00 : 00
DATE :          00 / 00 / 00

PLAY FROM SET TIME DATE

PLAY OLDEST
PLAY NEWEST



PRESS MENU EXIT TO EXIT MENU
```

- **TIME –** Use the number keys to enter a time in 24hr format.

- **DATE –** Use the number keys to enter a date in the format DD/MM/YY

- **PLAY FROM SET TIME DATE** – Plays the footage beginning from the time and date entered. If there is no footage at the time specified a jump is made to the nearest footage to the time given.

- **PLAY OLDEST –** Plays the oldest available footage on the Hard Disk Cartridge.

- **PLAY NEWEST –** Plays the most recent footage available on the Hard Disk Cartridge.

Main Menu

```
              MAIN  MENU

      OTHER          MENU
      NORMAL         RECORDING
      TIMER          RECORDING
      SHOT           RECORDING
      AUDIO          RECORDING
      ALARM          RECORDING
      ALARM          INPUTS
      ALARM          OUTPUT / LEDs
      VIDEO          SWITCHER
```
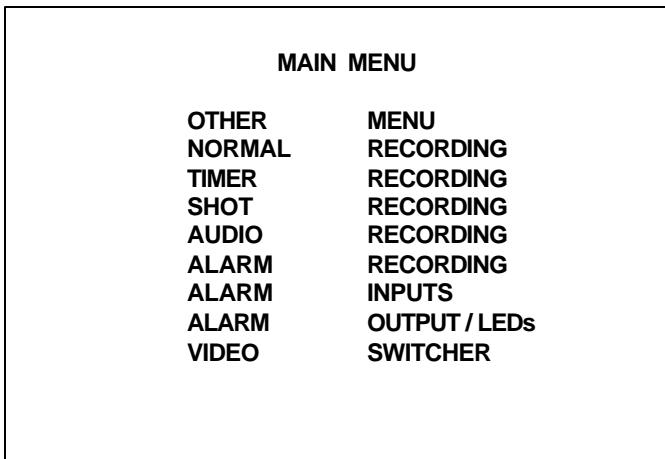
Sub-menus available from the MAIN MENU:

- **OTHER MENU –** Leads to the other menu items.
- **NORMAL RECORDING –** Default recording set-up activated by the record on/off button.
- **TIMER RECORDING –** Recording set-up activated by the inbuilt weekly interval timer.
- **SHOT RECORDING –** Shot Recording set-up activated by specified alarm inputs.
- **AUDIO RECORDING –** Set-up for audio recording.
- **ALARM RECORDING –** Recording set-up activated by the alarm inputs.
- **ALARM INPUTS –** Sets the open/closed conditions and actions for each of the 4 alarm inputs.
- **ALARM OUTPUTS –** Sets the open/closed condition and triggers for the alarm output. Sets the conditions for the external LED outputs.
- **VIDEO SWITCHER –** Sets the dwell times of individual or groups of cameras.

Other Menu

```
              OTHER  MENU

      FILES
      PASSWORD
      TIME AND DATE
      CAMERA TEXT
      FILE SYSTEM
      LAN
      GPS
      STATISTICS
      ADVANCED
      RESET
```
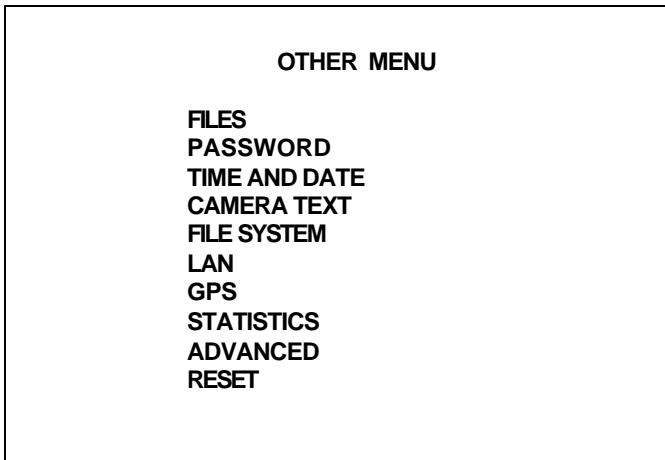
Sub-menus available from the OTHER MENU:

- **FILES –** Allows listing and access to all recordings on the Hard Disk Cartridge.
- **PASSWORD –** Settings for password protection and change password facility.
- **TIME AND DATE –** Change the system time and date plus summertime correction.
- **CAMERA TEXT –** Text labels for each camera can be entered in this menu.
- **FILE SYSTEM –** File organisation and health check.
- **LAN –** Set-up for LAN connection.
- **GPS –** Set-up to confirm connection of GPS device and format of GPS data.
- **STATISTICS –** General recoding and system statistics.
- **ADVANCED –** Advanced options.
- **RESET –** Reset recordings and/or retu rn menu to factory default settings.

Files Menu

```
                    FILES
  >FIRST  /  LAST PAGE
    PAGE          1 OF 1

W      00:20:00        01/01/04
W A    00:10:00        01/01/04
       00:00:00        01/01/04
```
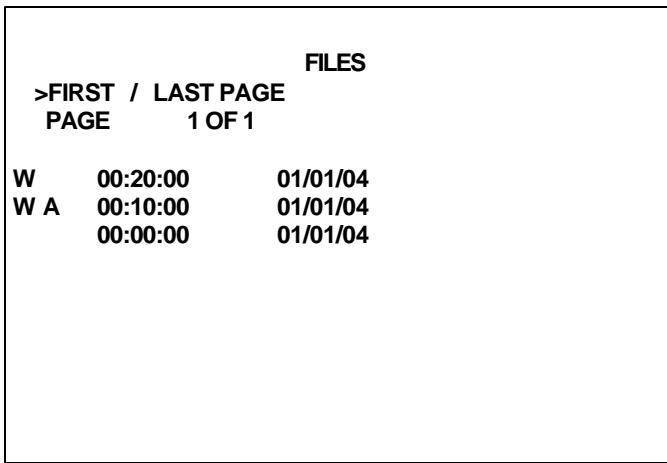
The files menu lists the files that are recorded on the Hard Disk Cartridge and allows the user to write-protect or remove write-protection for any file and provides instant jump to any file. The file listing is displayed on a number of pages with each page showing up to 10 files.

- **FIRST / LAST PAGE**

Use the left menu button to view the first page of the file listing. Use the right menu button to view the last page of the file listing.

- **PAGE**

Use the right menu button to advance to the next page of the file listing and the left menu button to move back to the previous page of the file listing. The current page and the total number of pages will be shown by 'x' OF 'x'. For example 1 OF 10 would indicate that page 1 is being shown out of a total of ten pages.

File Listing

The file listing shows files most recent first. Files marked with an 'A' indicate that it is an alarm recording and 'W' indicates that the file is write protected. In the above menu example there are 2 normal recording files and 1 alarm event file which has been write protected. All files are 10 minutes in duration.

Voluntary Write-Protection

Any file can be write-protected to avoid it being erased on loop recording. For example there may be some critical footage that needs to be kept but the user may want to continue recording on the same disk once he has protected this file. To write protect any file move the arrow cursor next to it in the file listing and press the left menu button, "W" will then appear next to the file showing that it is protected. Write-protection can be removed by pressing the left menu button again. In the above example the file 00:20:00 has been voluntarily write-protected. Pressing the left menu button again removes write-protection (the left menu button toggles the write protect status). Write-protected files appear as write-protected (read only) on the PC. You can change the write-protect status either on the PC or as explained on the X200. Any files that are not write-protected on the X200 get overwritten (oldest first) during the process of recording.

Jump to File

Press the right menu button to jump to the start of the file indicated by the arrow cursor.

Password Menu

```
┌─────────────────────────────────────────┐
│                                         │
│              PASSWORD                   │
│                                         │
│     PASSWORD REQUIRED FOR :             │
│                                         │
│     RECORD:              NO             │
│     MENU:                NO             │
│     SWITC HER:           NO             │
│     PLAY:                NO             │
│                                         │
│                                         │
│     >CHANGE PASSWORD  . . .             │
│                                         │
│                                         │
│                                         │
└─────────────────────────────────────────┘
```
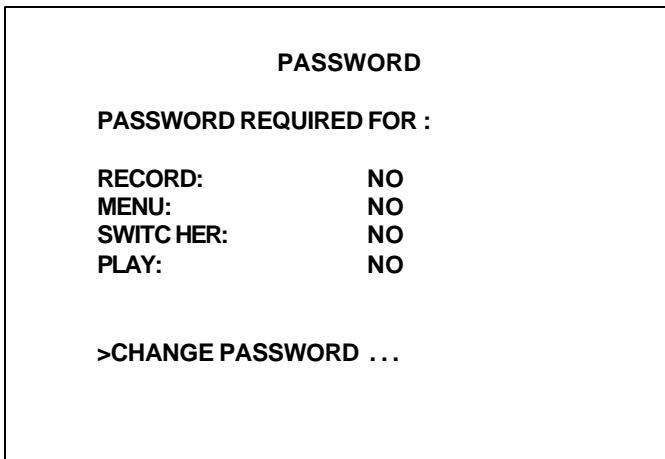
The password menu restricts user access to the four key parts of the system. Here is a summary of the menu selections available:

- **RECORDING** - If set to **YES**, the record button is password protected.

- **MENU** - If set to **YES**, access to the menu system is password protected.

- **SWITCHER** - If set to **YES**, the button to activate auto switcher mode is password protected.

- **PLAY** - If set to **YES**, the controls to review recorded footage are password protected.

If the user tries to access a protected function, he is asked to type in the password. The default password is 0000 when shipped. On correct password entry (four digits e.g. 3524 or 8912) the password protection is temporarily disabled. It is reinstated after 1 minute of no key presses. Protection is also automatically reinstated when leaving the password menu.

- **CHANGE PASSWORD** - The supervisor who knows the password is requested to type in the old password, followed by the new one. He is then requested to retype the new password. If he has done this successfully the new password is made the current one and the password protection is activated.

Hints

It is intended in a password protected system to at least protect the menu system. This ensures that important operating settings cannot be tampered with. Other protection may be required e.g. the record button may be disabled. Some examples are given overleaf.

Examples

Selection	Set to		
RECORDING	**YES**	**YES**	**NO**
MENU	**YES**	**YES**	**YES**
SWITCHER	**YES**	**NO**	**NO**
PLAY	**YES**	**NO**	**NO**
Result:	Full protection - no functions available.	Allow the user to review footage and look at live cameras only.	Allow the user to carry out basic functions, but without access to any menus.

The password for the unit when the unit is shipped is 0000. This may be changed as described previously.

In the event of complete password lockout contact your installer / distributor for a code for the X201 R eviewer. The user can enter a code on the X201 R eviewer which will enable him to reset the unit and reset the password.

Time and Date Menu

```
                    TIME AND DATE

        TIME:        >   00 : 00 : 00
        DATE:            01 / 01 / 04
        MODE            DD/MM/YY

        SET CLOCK TO THESE SETTINGS  . .


        SUMMERTIME ADJUST:          UK
        SUMMER / WINTER TIME:       WINTER
```
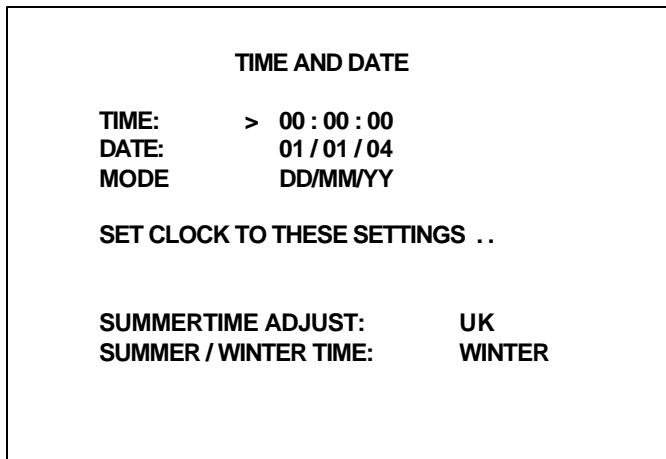
The time and date menu sets up the date, time and seasonal correction.

- **TIME** - Type a time using the numbered keys. Invalid times are prohibited

- **DATE** - Type a date using the numbered keys. Invalid dates are prohibited

- **MODE –** Use the left and right menu buttons to toggle the format the date is displayed in between DD/MM/YY and MM/DD/YY.

- **SET THE CLOCK TO THESE SETTINGS** - Press the right menu button to set the time and date as entered above.

You must use leading zeros for the time and date where necessary, e.g. 09:45 and 04/07/98. The unit is shipped from the factory with date and time set to GMT (UCT).

- **SUMMER TIME ADJUST** - Set this to OFF if you do not want the unit to automatically correct for daylight saving time. Select UK / EUR / USA for the unit to automatically adjust for daylight saving time in the UK, Central Europe or USA.

   UK - At 1:00 am on the last Sunday in March the clock is put forward 1 hour (summer time) At 2:00 am on the last Sunday in October the clock is put back 1 hour

   EUR - At 2:00 am on the last Sunday in March the clock is put forward 1 hour (summer time) At 3:00 am on the last Sunday in October the clock is put back 1 hour

   USA - At 2:00 am on the first Sunday in April the clock is put forward 1 hour (summer time) At 3:00 am on the last Sunday in October the clock is put back 1 hour

Summer Time Adjust is automatically applied even if the unit is switched off during the time at which the clocks go forwards or backwards. In the latter case correction is applied on power-up. A message is displayed indicating to the user that the time has been modified.

The Current time period is shown as either **SUMMER** or **WINTER** at the bottom of the menu screen.

Camera Text Menu

```
                 CAMERA    TEXT

CAM                    CAM
    1   C210KHD DOOR      2   C210KHD FRNT
    3   C210KHD REAR      4   C210KHD DRVR
    5                     6
    7                     8
    9                    10
   11                    12
   13                    14
   15                    16

    DUPLICATE TEXT FROM CAM 1  . .
    TIMESTAMP POS:  > BOTTOM LOW
```
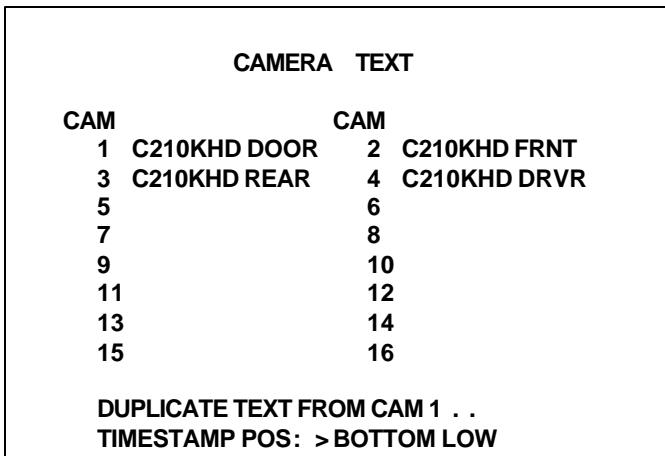
Allows the user to create an optional text label of up to 12 characters per camera.

Use the up and down 'MENU' arrow keys to move to the previous or next camera. Use the numbered keys on the X201 reviewer to cycle through the available characters for that key and the left & right 'MENU' arrow keys to move the highlighted cursor to the previous or next character respectively.

The numbered keys have the following 4 characters attached to them , pressing the key repeatedly will cycle through the 4 available characters. The fifth character on each key is a blank space; use this to delete any unwanted characters.

Key	Number/Characters	
1	A B C 1	(space)
2	D E F 2	(space)
3	G H I 3	(space)
4	J K L 4	(space)
5	M N O 5	(space)
6	P Q R 6	(space)
7	S T U 7	(space)
8	V W X 8	(space)
9	Y Z 9	(space)
0	0	(space)

Keep pressing keys 0 to 9 until the desired character appears. For example pressing key '1' gives the 'A' character, pressing again, the 'B' character, again the 'C' character, again the '1' character and finally the SPACE character. The sequence repeats.
The camera text will appear above the time stamp on each image. Like the time stamp it is embedded into each image and cannot be removed from the image.

- **DUPLICATE TEXT FROM CAM 1 –** Copies the current text from camera 1 to all other cameras. Move the arrow cursor next to this option and press either the left or right menu buttons to copy the text. This avoids repeat typing of vehicle registration numbers or other common text.

- **TIMESTAMP POS: -** The position of the timestamp can be moved to either bottom low/bottom-mid/bottom-high which are 3 positions below the main image or top-low/top-mid/top-high which are 3 positions above the main image. Select **NO TIMESTAMP** if you do not wish to see a timestamp on the recorded images.

A typical time stamp is shown below with camera text:

Camera Text

`JKN456Y DOOR`

`C1         12:00:00  27/07/01`
Camera   Time   Date
Number

The camera number indicates which camera grabbed the image, and the time and date indicate when the image was grabbed.

File System Menu

```
              FILE    SYSTEM

  RECORDING MODE : >LOOP RECORD

  FILE LENGTH :          10 MINUTES

  FILENAME TEXT :

  WRITE PROTECT ALARM REC :         NO
  WRITE PROTECT  SHOT  REC :        NO

  FILE SYSTEM CHECK MENU . .
```
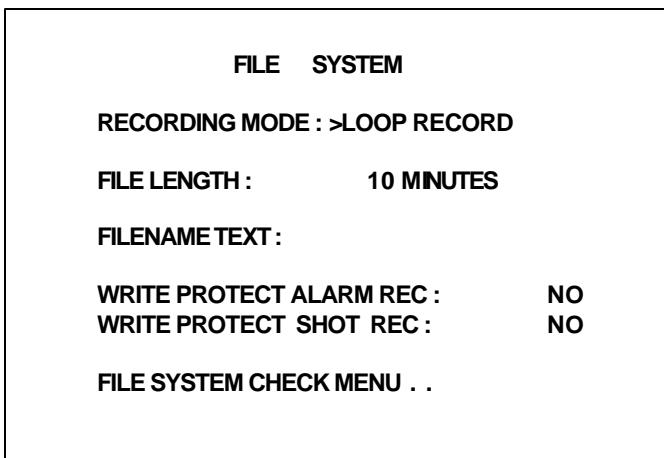
The file system menu controls how files are laid onto the disk.

- **RECORDING MODE-** Sets either **LOOP RECORD** (oldest files will be overwritten first when Hard Disk Cartridge is full) or **SINGLE PASS** recording (recording will stop when Hard Disk Cartridge is full).

- **FILE LENGTH – 10 MINUTES / 1 HOUR**
  This controls how often new files are created, s et the file length as appropriate. The 1 hour setting is useful if you are recording over a long period of time and it is desirable to have a smaller number of files to manage or archive. The 10 minute setting gives more files but each is of a small size and this may help in searching for specific short duration events.

- **FILENAME TEXT –** Enter up to 12 characters of text that will appear at the start of all files. For mobile applications a vehicle registration number could be used. The X200 serial number could also be used.

  This improves the audit trail. Please note that the filename and serial number are buried into each file for audit trail purposes and can be verified.

- **WRITE PROTECT ALARM REC –** Select whether alarm recording files are write protected. If alarm recording files are write protected they will not be deleted on loop recording (LOOP RECORD setting).

  To remove write-protection either use the files menu and the left menu button (toggle 'W' status) or delete all recordings via the reset menu.

- **WRITE PROTECT SHOT REC –** Select whether shot recordings are write protected. This is the same as per the **WRITE PROTECT ALARM REC** function but only affects shot recording files.

- **FILE SYSTEM CHECK MENU –** Accesses the file system check menu.

File System Check

```
                    FILE  SYSTEM CHECK

ON POWER SWITCH ON :
       > CHECK AND CORRECT

  PERFORM CHECK ONLY NOW

  PERFORM CHECK AND CORRECT NOW
```
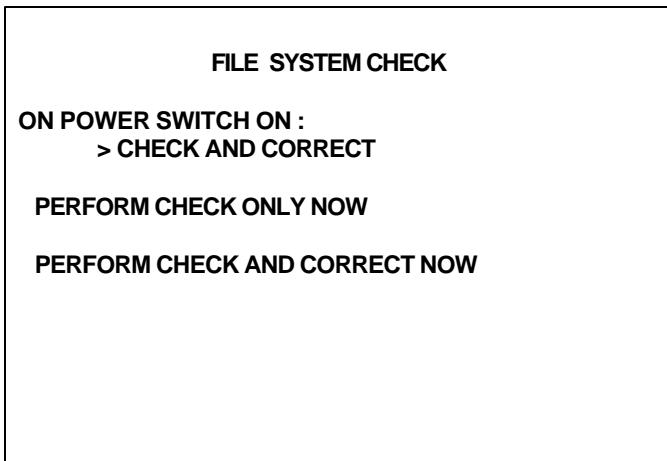
This menu sets the default file checking and correcting action on switch on and can be used to check and/or correct files manually at any time.

- **ON POWER SWITCH ON**

  NO CHECK / CHECK ONLY / CHECK AND CORRECT – Gives the option to check the file system at power on and optionally correct any errors. This is the recommended option as the X200 will check and correct both the file system and FAT of the Hard Disk Cartridge on start-up.

- **PERFORM CHECK ONLY NOW –** Pressing the right menu button will perform a file system check.

- **PERFORM CHECK AND CORRECT NOW –** Pressing the right menu button will perform a file system check and fix any errors that are found.

LAN Menu

```
                    LAN

IP ADDRESS :      >    10.     0.      0 . 200

SUBNET MASK :         255 . 255 . 255 .    0

GATEWAY :              10.     0.      0 . 255

  PING TEST  . . .


MAC :               0 0 : 0 F : B 4 : 0 0 : 0 0 : 0 0
```

- **IP Address –** For devices communicating on a network, messages must identify the source and destination with an address. The IP (internet protocol) address is a 32-bit number that uniquely identifies a device connected to the network and is usually represented in a dotted decimal form.

  e.g. `10.0.0.28`

  Use the right and left menu arrow keys to move across the input fields and the number keys to input the address.

- **Subnet Mask –** The subnet mask is used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address. Subnetting enables a network administrator to further divide the host part of the address into two or more subnets. In this case, a part of the host address is reserved to identify the particular subnet.

  The subnet mask is the network address plus the bits reserved for identifying the subnetwork. (By convention, the bits for the network address are all set to 1.) As a mask, it can be used to identify the subnet to which an IP address belongs by performing a bitwise AND operation the mask and the IP address. The result is the subnetwork address.

  Use the right and left menu arrow keys to move across the input fields and the number keys to input the address.

- **Gateway –** This is the address of the 'gateway' in a network that a computer will use to access another network if a gateway is not specified for use. In a network using subnets, it is the address of the router that forwards data traffic to a destination outside of the subnet of the transmitting device.

  Use the right and left menu arrow keys to move across the input fields and the number keys to input the address.

- **Ping Test ... –** Selecting this option by pressing the right menu button will bring up the 'ping test' menu which is shown below.
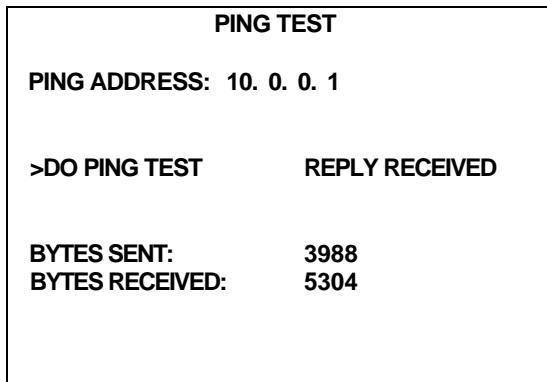
```
              PING TEST

PING ADDRESS:  10.  0.  0.  1


>DO PING TEST          REPLY RECEIVED


BYTES SENT:            3988
BYTES RECEIVED:        5304
```

Enter the destination IP address of the unit you want to test communication with on the ping address line by using the left and right menu buttons to move across the fields and the number keys and then select DO PING TEST .... If the destination receives the ping message and replies within 10 seconds then REPLY RECEIVED is d isplayed; otherwise 'NO REPLY' is displayed.

The BYTES SENT and BYTES RECEIVED fields update in real-time to show how many bytes are being transferred to and from the X200 and can provide further indication of data transfer.

- **MAC –** All network devices include a unique media access control (MAC) address used to identify it on a network. The address is a 48 bit number, usually represented as 6 bytes – each byte written in hexadecimal notation.

All Timespace Technology devices have a MAC address which begins 00 0F B4 followed by another three bytes.

    e.g. `00 0F B4 00 0A 48`

The X200 LAN menu option allows the user to display its MAC address which may be useful in configuring access control with wireless networks.

GPS Menu

```
                    GPS

        EMBED GPS POSITION :        NO
        EMBED GPS SPEED :           NO
        SPEED UNITS :               MPH

        SYNC  CLOCK WITH GPS :      NO



        NO GPS CONNECTED
```
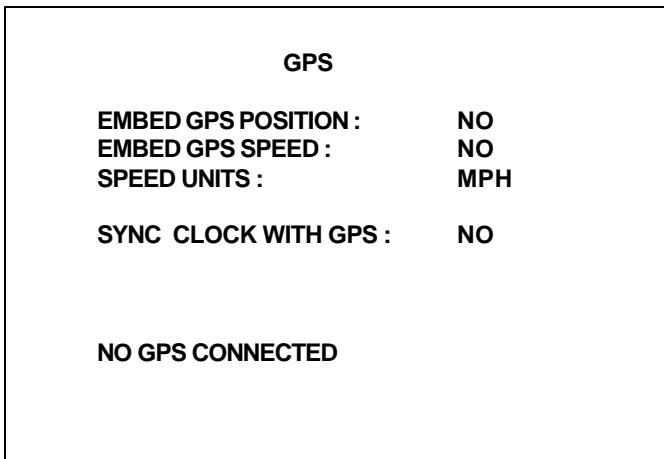
- **Embed GPS Position –** Selecting YES will cause the position information to be embedded in the recorded image.

- **Embed GPS Speed –** Selecting YES will cause the speed information to be embedded in the recorded image.

- **Speed Units –** Select either KPH for kilometres per hour or MPH for miles per hour.

- **Sync Clock with GPS –** The X200 Digital Recorder includes a clock which is used to timestamp recording files and overlay the date and time on recorded images. Although accurate, the system can be configured to synchronize the clock with the date and time information received from the GPS receiver.

    Synchronization only occurs when the X200 is powered up and before it starts recording. At this time the built-in clock may be corrected by a maximum of 20 seconds if a previous discrepancy has been detected between the internal time and the GPS receiver time.

    Selecting YES will synchronize the X200 clock on power up. The time received from the GPS receiver is always UTC (Coordinated Universal Time) which is the same as GMT (Greenwich Mean Time).

The current status of the attached GPS device (mouse) is show at the bottom of the screen which indicates whether it is connected and able to lock to the GPS satellites.

Statistics Menu

```
                    STATISTICS

          OPERATING SYSTEM:    1.0

     HARD DISK :
     20.0              SIZE IN GIGABYTES
     50%               USED
     20%               WRITE PROTECTED

     31                FILES
     01 / 01 / 04      START DATE
     31 / 01 / 04      END DATE
     31.0              DAYS RECORDING
```

The statistics page gives the operating system version number, disk size, percentage used and percentage write protected. Recording statistics are updated every minute and are intended to be used for monitoring a camera system and to provide an indication of the capacity of the X200 in different recording environments.

The total number of files along with the start date, end date and total amount of days recording are shown.

Advanced Menu

```
                    ADVANCED

  >  USE RECORD STATE AT POWER OFF
     ENABLE X200 RECORD BUTTON:  YES

     LOAD SYSTEM UPGRADE  . .
     SAVE SYSTEM UPGRADE  . .

     RECORDING MODE FOR :
       NORM / TIMER:        >COND. REFRESH
       ALARM / SHOT:         FULL UPDATE

     MODEM LOOPBACK TEST
     H/W VER: 16AE           SERIAL NUMBER: 42
```
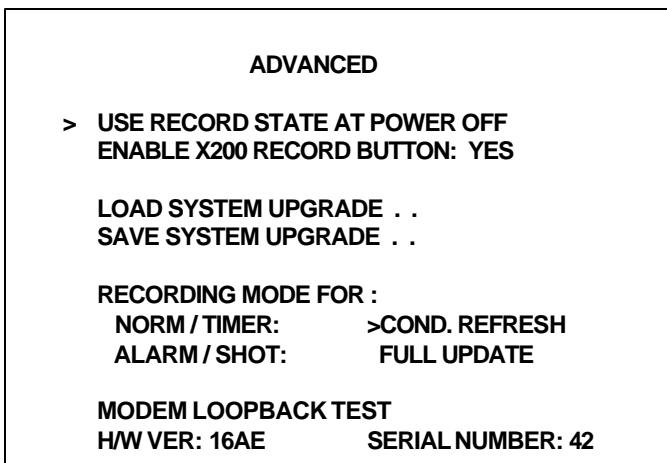
The advanced menu provides control over more sophisticated X200 functions.

- **USE RECORD STATE AT POWER OFF /
  DO NOT RECORD AT POWER UP /
  RECORD AT POWER UP**

  The default setting USE RECORD STATE AT POWER OFF means that if the unit was
  recording when it was switched off it will record when it is switched back on. Also if the unit
  wasn't recording when it was switched off it won't be recording when it is switched on. This
  setting is generally convenient for covert use where recording is switched on and off by
  pressing the record button and the unit continues the way it left off.

  The DO NOT RECORD AT POWER UP setting is useful if manual adjustments need to be
  made to the menu settings every time the unit is switched on prior to recording. Note that
  the unit will not do normal recording after a loss of power e.g. in a power cut so this setting
  should be used with caution.

  The RECORD AT POWER UP setting should be used if the unit is <u>always</u> to do normal
  recording on power up. This is important in vehicle applications where the user may have
  inadvertently switched the unit off in a non-recording state (e.g. he has just been playing
  back some footage and he switched off recording to make this easier). With this setting
  however the unit is left at switch off, it will record the next time it is powered up.

- **ENABLE X200 RECORD BUTTON –** If set to **YES** the 'Record' button on the front of the
  X200 will switch Normal Recording on and off. If set to **NO** this button is disabled.

- **LOAD SYSTEM UPGRADE –** This loads a new version of the X200 operating system from
  the Hard Disk Cartridge. Do the following.

  Delete all recordings on the Hard Disk Cartridge using the reset menu.
  Using the USB interface kit copy the new .xos file from the PC to the Hard Disk Cartridge.
  Insert the Hard Disk Cartridge into the X200 and run LOAD SYSTEM UPGRADE by
  pressing the right menu button.

  Check the software version in the statistics menu to verify the new version has been loaded.

- **SAVE SYSTEM UPGRADE –** This saves the X200 operating system, current menu settings and log information to the Hard Disk Cartridge.

  The cartridge can then be used as a master to set up another X200 with the same software version and menu settings. Use LOAD SYSTEM UPGRADE on the other X200 with the master cartridge inserted.

- **RECORDING MODE FOR:**

  NORM / TIMER :
  ALARM / SHOT :

  COND. REFRESH / FULL UPDATE – The recording mode is selectable for normal and timer recording and also for alarm and shot recording.

  Specify **FULL UPDATE** to record full image information or **CONDITIONAL REFRESH** to record only the parts of the image that have changed.

  In most cases conditional refresh will be the preferred option as the file size on disk is reduced from that required for full update.

- **MODEM LOOPBACK TEST**

  The modem loopback test checks that the internal X200 hardware is functioning correctly so that it can be successfully used with an external modem. A special female 9 -way D socket is required with pins 2 & 3 connected together and pins 1, 7 & 8 connected together. This is connected to the male RS232 socket on the rear panel of the X200 before conducting the modem loopback test. The RS232 connector is detailed in the Connector Specifications section of the X200 manual.

  To start the test press the right menu button. If **PASS** is shown on the menu screen next to the **MODEM LOOPBACK TEST** then the internal hardware is functioning correctly.

The hardware version (H/W VER) and serial number of the X200 are also shown at the bottom of the menu screen for reference.

Reset System Menu

```
                    RESET SYSTEM

   >   DELETE ALL RECORDING FILES

       RESET MENU TO FACTORY
       DEFAULT STATE

       MENU LANGUAGE:        ENGLISH
```
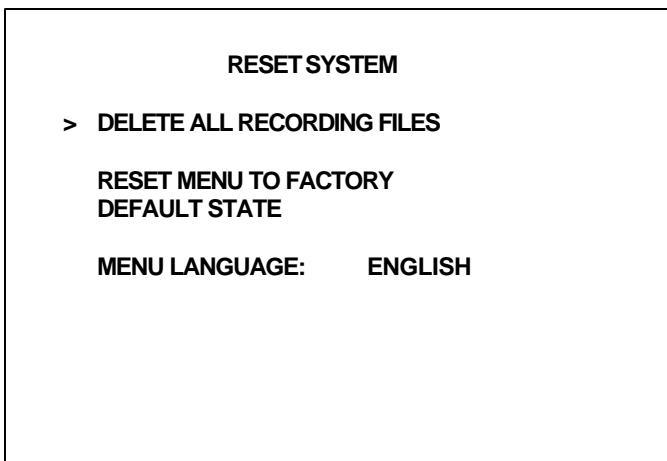
- **DELETE ALL RECORDING FILES –** Removes all recordings from the hard disk including write-protected files. Only do this if you want to completely remove all recordings from the hard drive as there is no undo option. Press the right menu button to go to a warning screen, pressing the right menu button again will carry out this action whilst pressing the MENU EXIT button will abort this procedure.

- **RESET MENU TO FACTORY DEFAULT STATE –** Pressing the right or left menu button will immediately reset the entire X200 menu system to its default settings. Please note that there is no undo option.

- **MENU LANGUAGE –** Sets the language that the menu is displayed in.

Normal Recording Menu

```
                    NORMAL RECORDING

   CAMERAS              IMAGES / SEC    RESOLUTION

       1  TO   4    >   5                   HIGH
       2  TO  16        NO RECORDING        LOW


   ONLY RECORD CONNECTED CAMERAS
   COL  B&W     01 02 03 04  05  06  07  08
                09  10  11  12  13  14  15  16


   20 IMAGES / SEC OUT OF 25 MAX
```
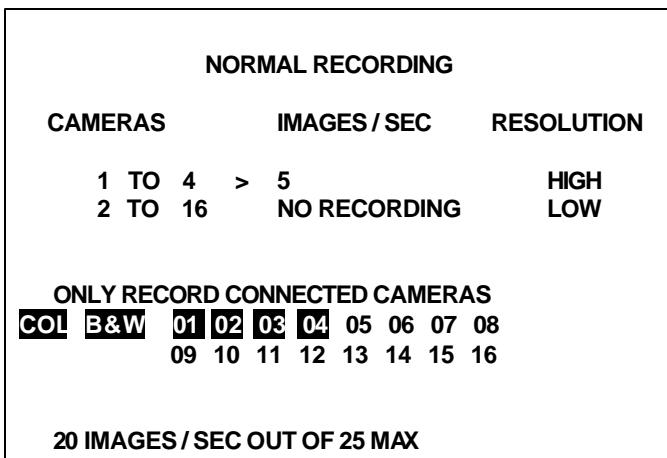
This menu sets the images per second and image resolution recorded by each camera during normal recording.

- **CAMERAS –** Use the up and down menu buttons to move between items in the menu. Pressing the right and left menu buttons next to a camera group will increase or decrease the number of cameras in that group respectively.

  Please note that this applies to the X200-16. The X200-04 lists each of the 4 cameras separately.

- **IMAGES / SEC**

  NO RECORDING / 0.1 / 0.2 / 0.3 / 0.4 / 0.5 / 0.6 / 0.7 / 0.8 / 0.9 / 1.0 / 1.2 / 1.5 / 2.0 / 2.5 / 3.0 / 4.0 / 5.0 / 6.0 / 7.0 / 8.0 / 9.0 / 10 / 12 / 15 / 20 / 25 / MAX RATE- This sets the number of images per second to be recorded by a camera during normal recording up to a total of 25 images per second for all cameras added together. If **MAX RATE** is selected then the X200 will automatically adjust the images per second for each of the specified cameras so that the total is equal to 25 images per second.

- **RESOLUTION – This can be set to:**

  LOW – This sets the highest level of compression. Although file sizes will be comparatively small, visible blocking artefacts may be seen.
  MEDIUM – This sets the medium compression level, images with little loss of quality which will be adequate for most applications.
  HIGH – This sets a medium -low level of compression with gains in image quality over medium resolution but with larger file sizes.
  V.HIGH – This sets the lowest level of compression with the best image quality but the largest file sizes.

- **ONLY RECORD CONNECTED CAMERAS**
  RECORD ALL SPECIFIED CAMERAS

  This sets whether the X200 will only record on connected cameras shown as highlighted on the connected camera list 01 – 16 at the bottom of the menu screen (01 – 04 on the X200-04) or whether the X200 will record on all cameras specified in the recording parameters shown at the top of the menu screen.

- **COL B&W 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16**

  The connected camera list highlights all connected cameras in either red or white to indicate that either a colour (red highlight) or black and white (white highlight) camera is connected to the corresponding input number.

- **X IMAGES / SEC OUT OF 25 MAX –** This displays how many images per second will be recorded during normal recording out of the X200 25 images per second maximum limit. Although less than 25 images per second can be recorded, the X200 is not able to record more than 25 images per second.

  If the maximum of 25 images per second is exceeded by the sum of all the cameras then the **X IMAGES / SEC OUT OF 25 MAX** text will change to red as a warning. If this is not corrected then the X200 will still record but it will automatically adjust the images per second for each camera so that the total does not exceed 25.

  In the example menu screen shown above cameras 1 – 4 have been set to 5 images per second. This gives a total sum of 20 images per second out of the available 25.

Timer Recording Menu

```
                    TIMER RECORDING

  CAMERAS              IMAGES / SEC     RESOLUTION

      1  TO   4    >   5                HIGH
      2  TO  16        NO RECORDING     LOW


  SET TIMER START / STOP TIMES   . . .
  WHEN TIMER STOPS :    STOP REC.

  20 IMAGES / SEC OUT OF 25 MAX
```
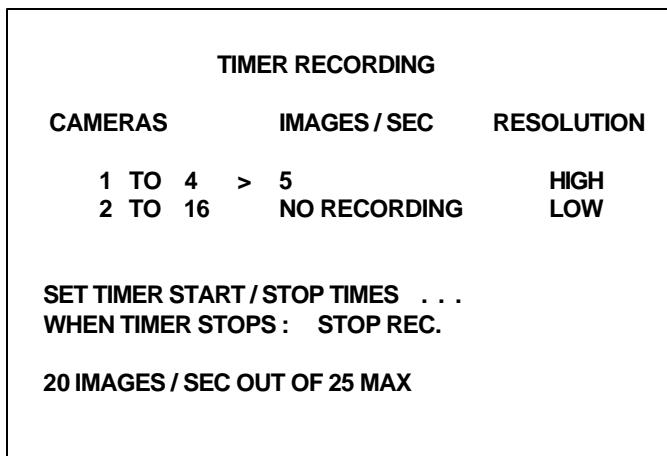
This menu sets the images per second and image resolution recorded by each camera during timer recording. Preference for times of recording and dates to be excluded can also be set in the 'timer recording times' sub-menu accessible from this menu.

Use the up and down menu buttons to move between images per second and resolution for each camera and the left and right menu buttons to scroll between the options. Pressing the right menu button next to SET TIMER START / STOP TIMES accesses the timer recording times sub-menu.

- **CAMERAS –** Use the up and down menu buttons to move between items in the menu. Pressing the right and left menu buttons next to a camera group will increase or decrease the number of cameras in that group respectively.

  Please note that this applies to the X200-16. The X200-04 lists each of the 4 cameras separately.

- **IMAGES / SEC –** These settings are the same as described in the normal recording menu, except they apply only during timer recording.

- **RESOLUTION –** These settings are the same as described in the normal recording menu, except they apply only during timer recording.

- **SET TIMER START / STOP TIMES -** Pressing the right menu button nest accesses the timer recording times sub-menu described on the next page.

- **WHEN TIMER STOPS** – Pressing the left or right menu buttons chooses between **STOP REC.** and **NORMAL REC.** This option decides whether the X200 will stop recording when the defined timer recording period has ended (STOP REC.) or whether it will continue recording in normal recording mode (NORMAL REC.).

- **X IMAGES / SEC OUT OF 25 MAX** – This displays how many images per second will be recorded during timer recording out of the X200 25 images per second maximum limit. This display is the same as found in the normal recording menu, except it applies only during timer recording.

Timer Recording Times Menu

```
              TIMER RECORDING TIMES

   >  IGNORE DAILY TIMES
      MON    08:15   TO      17:00    COPY
      TUE    08:15   TO      17:00    DOWN
      WED    08:15   TO      17:00
      THU    08:15   TO      17:00
      FRI    08:15   TO      17:00
      SAT    00:00   TO      00:00
      SUN    00:00   TO      00:00

      IGNORE PERIOD TIMES
      FROM : 00:00            00 / 00 / 00
      TO :   00:00            00 / 00 / 00
```

The timer recording times menu sets the times that will be included or excluded for timer recording. A period of exemption/inclusion can also be set by date. This menu is a sub-menu of the timer recording menu and is accessed by pressing th e right menu button next to the SET TIMER START / STOP TIMES option in the timer recording menu.

- **IGNORE DAILY TIMES**
  RECORD BETWEEN DAILY TIMES
  RECORD OUTSIDE DAILY TIMES

  Use the right and left menu buttons to scroll between the available options. The default setting IGNORE DAILY TIMES disables timer recording, the setting RECORD BETWEEN DAILY TIMES will mean that timer recording will automatically take place between the start (left hand time column) and end times (right hand time column). The setting RECORD OUTSIDE DAILY TIMES does exactly the opposite with timer recording automatically taking place outside of the specified times.

Setting the daily times and using the COPY DOWN function.

Use the up and down menu buttons to move the arrow cursor up and down the list of start and end times for each day. When the cursor is next to a particular start / end time use the numbered keys on the X201 reviewer to enter a time in 24hr clock format. Please note that 4 digits must always be entered so single digit hour times such as 8am must be entered as 08:00 as per the normal 24hr clock. To exclude any particular day from timer recording simply type in 00:00 for both times as per SAT and SUN in the example above.

The **COPY DOWN** function allows the current times set for MON to be copied to all other days on the list. This avoids unnecessary repetition when entering timing periods where daily recording times are the same. Once the times for MON have been copied to all other days they may be individually changed as per normal. For instance in the above example the times for MON - 08:15 TO 17:00– were copied to all other days using the COPY DOWN function and then SAT and SUN were individually set to 00:00 to exclude them from timer recording.

- **IGNORE PERIOD TIMES**
  RECORD INSIDE PERIOD
  RECORD OUTSIDE PERIOD

  This enables the user to set a period of time, by time and date which is to be excluded/included from the daily timer recording parameters. Use the menu up and down buttons to move between the times and dates and enter the time or date using the number keys. The time is in 24hr clock format and the date is in the format DD/MM/YY.

Examples of Timer Recording

The daily times and period times are able to work together or independently to record as and when required. For example -

Recording Monday to Friday from 9am to 5pm.

Select RECORD BETWEEN DAILY TIMES and set the daily times on Monday to Friday from 09:00 TO 17:00 and Saturday and Sunday to 00:00 TO 00:00. Select IGNORE PERIOD TIMES to disable the calendar period function.

Recording Monday to Friday from 9am to 5pm but not in the month of June in 2004.

Select RECORD BETWEEN DAILY TIMES and set the daily times on Monday to Friday from 09:00 TO 17:00 and Saturday and Sunday to 00:00 TO 00:00. Select RECORD OUTSIDE PERIOD in the calendar period function and set the FROM and TO as 00:00 01/06/04 and 00:00 30/06/04 respectively. This will prevent recoding from midnight on the first of June to midnight on the 30th of June 2004.

Recording continuously for 3 weeks starting at 7am on the 21st of August 2004.

Select IGNORE DAILY TIMES to disable the daily recording times (this is necessary as recording is to take place for 24hours a day during the calendar period). Select RECORD INSIDE PERIOD and set the FROM and TO as 07:00 21/08/04 and 07:00 11/09/04 respectively.

Shot Recording Menu

```
                    SHOT RECORDING

        CAMERAS :              >  ALARM IN MENU

        RESOLUTION :              LOW

        NUMBER OF SHOTS :         1

        IMAGES / SEC :            1.0




```

Shot recording allows a defined number of shots (images) to be recorded from an alarm input trigger.

- **CAMERAS** – This takes the user to the alarm inputs menu in which they can which alarm inputs will be used as a trigger for shot recording and from which cameras to record images. Please see the section on the alarm inputs menu for a detailed description of the available settings.

- **RESOLUTION -** These settings are the same as described in the normal recording menu, except they apply only during shot recording.

- **NUMBER OF SHOTS**

  1 / 2 / 3 / 4 / 5 / 8 / 10 / 15 / 20 / 25 / 30 / 50 / 100 / 150 / 250 / 500 – This sets the number of shots to be taken from each camera during shot recording. Use the left and right menu buttons to scroll from between 1 to 500 shots.

- **IMAGES / SEC** – These settings are the same as described in the normal recording menu, except they apply only during shot recording.

Audio Recording Menu

```
                    AUDIO RECORDING

        AUDIO RECORDING :        >  OFF

        INPUT 1 WITH   :            ALL CAMERAS
        INPUT 2 WITH   :            CAMERA 1

        SAMPLING RATE :            16 kHz
        SAMPLING RESOLUTION :      16 BITS
        RECORD INPUT RANGE :       1.00 Vrms
        INPUT 1 LEVEL :      NOT RECORDING
        INPUT 2 LEVEL :      NOT RECORDING

        PLAYBACK VOLUME :          HIGH
```

- **INPUT 1 WITH**
  INPUT 2 WITH

  ALL CAMERAS / CAMERA 1 / CAMERA 2 / CAMERA 3 / CAMERA 4 / CAMERA 5 / CAMERA 6 / CAMERA 7 / CAMERA 8 / CAMERA 9 / CAMERA 10 / CAMERA 11 / CAMERA 12 / CAMERA 13 / CAMERA 14 / CAMERA 15 / CAMERA 16 – Associates audio inputs 1 and 2 with a specific single camera or with all cameras. The X201 reviewer will play back the audio recorded for this input with the camera specified.

  Please note that this applies to the X200-16. The X200-04 will only have cameras 1-4 listed.

- **SAMPLING RATE** – The X200 records audio at a sampling rate of 16 kHz.

- **SAMPLING RESOLUTION –** The X200 records audio at a sampling resolution of 16 bits.

- **RECORD INPUT RANGE**

  0.12 Vrms / 0.25 Vrms / 0.50 Vrms / 1.00 Vrms / 2.00 Vrms – This defines the maximum signal that can be accommodated before clipping occurs. If distortion due to clipping is experienced, increase the audio input range.

  For good noise performance reduce the audio input range until clipping is experienced and then increase the range by one increment.

- **INPUT 1 LEVEL**
- **INPUT 2 LEVEL**

  This gives an indication of current audio input level for each channel whilst recording and will be of use when setting the record input range. The level is given in both dB and as a percentage of the maximum input level before clipping. **NOT RECORDING** will be shown if the X200 is not currently recording.

- **PLAYBACK VOLUME**

  LOW / MEDIUM / HIGH / FULL / MUTE – Select the volume level for audio play back via the X201 Reviewer and the line-level output on the rear of the X200.

Alarm Recording Menu

```
                    ALARM RECORDING

CAMERAS        IMAGES / SEC         RESOLUTION

 1  TO  3   >  3                    MEDIUM
 4  TO  16     NO RECORDING         LOW



ALARM INPUTS MENU  . . .
POST – TRIGGER RECORDING :          OFF

```

Camera groups for alarm recording can be created, the number of images per second and resolution of recording can be set for each group.

- **CAMERAS –** Use the up and down menu buttons to move between items in the menu. Pressing the right and left menu buttons next to a camera group will increase or decrease the number of cameras in that group respectively.

  Please note that this applies to the X200-16. The X200-04 lists each of the 4 cameras separately.

- **IMAGES / SEC –** These settings are the same as described in the normal recording menu, except they apply only during timer recording.

- **RESOLUTION –** These settings are the same as described in the normal recording menu, except they apply only during timer recording.

- **ALARM INPUTS MENU –** Pressing the right menu button enters the Alarm Inputs sub-menu.

- **POST – TRIGGER RECORDING**

  OFF / 5 SECS / 10 SECS / 20 SECS / 30 SECS / 45 SECS / 1 MIN / 5 MINS / 10 MINS / 20 MINS / 30 MINS / 45 MINS / 1 HOUR / 2 HOURS – Alarm recording can take place only for the duration of an alarm event (OFF) or can continue for a specified period of time after the event has ceased.

  Therefore if an alarm input is only likely to be a momentary event but the ten minutes after that event is also important select 10 MINS for post trigger recording.

Alarm Inputs Menu

```
                    ALARM INPUTS

IN      ACTIVE        FUNCTION              CAMS

1    >  CLOSED        NONE
2       CLOSED        NONE
3       CLOSED        NONE
4       CLOSED        NONE

CURRENT STATE :              CLOSED / OPEN

        1             2             3          4
```

The Alarm Inputs menu defines what the X200 will do when the 4 alarm inputs are either in a closed or open state. Closed is defined as a connection to the '-' terminal of the X200 input/output connector, whilst open indicates that no contact is being made.

The 4 inputs are listed in order as shown in the screen shot above, for each of the 4 inputs the following options are available.

- **ACTIVE–** Use the left and right menu buttons to toggle between CLOSED and OPEN. This sets the state which triggers an alarm event and will cause the defined action to take place.

- **FUNCTION –** This defines the action of the X200 when the selected alarm input is active.

  NONE – No action.

  NORM REC – Switches normal recording on and off instead of the X201 record button.

  ALARM REC – Sets the X200 to do alarm recording with the settings for images per second and resolution as defined in the Alarm Recording Menu. The cameras to be recorded can be set in the right hand **CAMS** column by pressing the right and left menu buttons to raise or lower the current number respectively.

  In this way an alarm input can trigger recording on a single or a group or cameras. Multiple alarm input triggers will cause camera ranges to be combined.

  SHOT REC – Sets the X200 to do shot recording with the settings defined in the Shot Recording Menu. As per ALARM REC a single or group of cameras can be specified.

  SWITCHER – Sets the X200 video switcher to view the selected camera for the duration of an alarm event (plus post trigger time if selected). Change the desired camera to be viewed during an alarm event using the right and left menu buttons to change the camera number in the **CAMS** column.

  TIMER REC – Sets the X200 to timer recording as per the settings in the Timer Recording Menu.

- **CURRENT STATE –** Shows the current OPEN / CLOSED state of each of the 4 alarm inputs. The corresponding number for each alarm input will be highlighted for **CLOSED** and not highlighted for **OPEN**.

Alarm Output / LEDs Menu

```
                     ALARM OUTPUT / LEDs

LED1 OUTPUT :                 >      RECORD
LED2 OUTPUT :                        OFF

ALARM OUTPUT :                >  OPEN
         WHEN  . . .
FRONT LEDS :                         NO
CAMERA DISCONNECTED :                NO
HARD DISK WRITE PROTECT :            NO
HARD DISK FULL :                     NO
ALARM OCCURRED :                     NO
```

This menu sets the conditions for the external LED outputs and alarm output.

- **LED1 OUTPUT**
- **LED2 OUTPUT**

   OFF / FAIL / SERVICE / RECORD / ON – LED output 1 can be set to be permanently off or
   on or to duplicate the state or the fail, service or record LED's on the front panel of the
   X200.

- **ALARM OUTPUT**

   FRONT LEDS – Can be set to **NO / SERVICE / RECORD** to make the alarm output active if
   either the service or record LED's are lit on the X200 front panel.

   CAMERA DISCONNECTED – When set to **YES** the alarm output is activated when a
   camera is disconnected from the X200 whilst recording on that camera. The alarm output
   will become inactive 5 seconds after the camera is reconnected.

   HARD DISK WRITE PROTECT – If all the disk is write protected then recording will stop.
   To give the user warning the alarm output can be used to signal when the disk is either **25%
   / 50% / 60% / 70% / 80% / 90% / 100%** write protected.

   HARD DISK FULL – If all of the disk is full and single pass recording has been enabled
   then recording will stop. To give the user warning the alarm output can be used to signal
   when the disk is either **25% / 50% / 60% / 70% / 80% / 90% / 100%** full.

   ALARM OCCURRED – When set to **YES** the alarm output is activated when an alarm event
   has occurred. A battery and sounder may be connected to the alarm output terminals so
   that the user is audibly informed of any new alarm event. The alarm condition is cleared
   when the triggering condition has cleared.

Video Switcher Menu

```
                    VIDEO SWITCHER

CAMERA                      DWELL TIME

     1  TO  4          >  1 SEC
     5  TO  16            SKIP
```
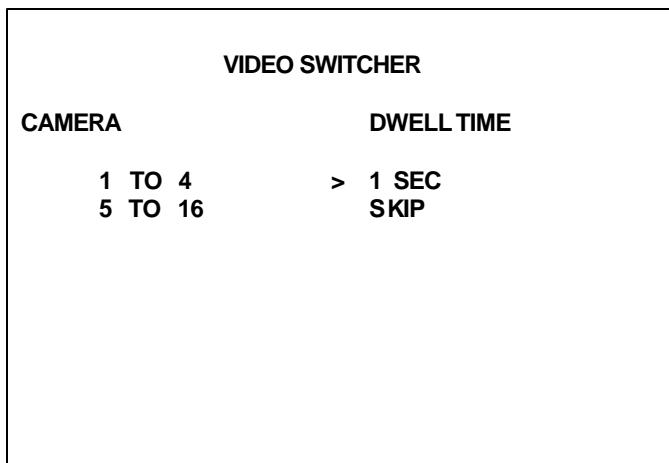
The video switcher menu controls the automatic switching of cameras on the switcher output at the back of the X200 (X200-16 only) and also on the main video output when the unit is in AUTO mode (selected by pressing the AUTO key on the X201 Reviewer). On the X201 the number key LED is illuminated for the camera shown (1-8 number keys for cameras 1-8 with the addition of the 9-16 LED lit for cameras 9 – 16) and the live picture is viewable on the monitor.

- **CAMERAS –** Use the up and down menu buttons to move between items in the menu. Pressing the right and left menu buttons next to a camera group will increase or decrease the number of cameras in that group respectively.

  Please note that this applies to the X200-16. The X200-04 lists each of the 4 cameras separately.

- **DWELL TIME –** The dwell time can be set from 1 – 30 seconds by using the right and left menu buttons to scroll through the options. Dwell time is how long the switcher will stay on a camera before moving to the next camera. If a camera or group of cameras does not need to be included in the switcher set this option to **SKIP.**

HARD DISK CARTRIDGE

Please note that the use of Hard Disk Cartridges other than those manufactured by Timespace Technology will invalidate the warranty of the X200 recorder.

The X200 records onto a 2.5" IDE hard disk contained in a cartridge. This cartridge is removable and can be swapped between X200's.

The cartridge contains custom electronics. Only T401-series Hard Disk Cartridges can be used with the X200.

The cartridge is connected to a PC for accessing and archiving files using the USB Interface Kit. Please refer to the section on the USB Interface Kit for detailed instructions.

WARNING: Hard Disk Cartridge s are sensitive to shock, vibration and humidity.

X201 REVIEWER

Function

The X201 Reviewer is used to program the menu settings on X200 and to review recordings on the installed Hard Disk Cartridge.

Connect Data Link Cable (supplied with X201 Reviewer) from socket marked "Reviewer" on X200 to socket marked "Recorder" on X201. This connection provides power, video and audio from X200 to X201.

When power (12V ±1.2V) is applied to the X200 and fed to the reviewer via the Data Link Cable the red LED on the bottom panel of the reviewer is illuminated.

The X200 display will be shown on the X201 monitor.

Press the buttons on the X201 to control the X200.

WARNING: When X201 is connected to X200 the power supplied to the X200 must be 12V+/-1.2V.

The X201 has 5 picture adjustment pots situated at the bottom of the left-hand side of the reviewer; these should not under most circumstances need adjusting from the factory settings. If however an adjustment is necessary then please ensure that an appropriate plastic trimmer tool is used in a gentle manner.

These 5 picture adjustment pots are classified as follows.

      i)   NTSC Tint (colour balance when using an NTSC feed)
      ii)   Colour
      iii)   Brightness
      iv)   Contrast
      v)   Sharpness (image pixel sharpness/smoothness adjustment)
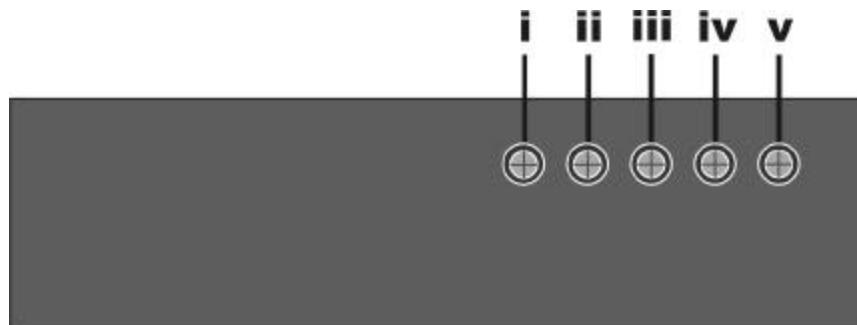
Controls

The keys on the X201 can be grouped into Menu Navigation, Playback & Recording, Camera Switcher and Search & Help.

Menu Navigation
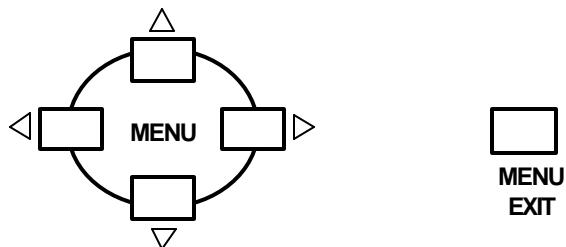
Press any of the 4 menu buttons to enter the main menu. Once in the menu system, their function is as follows:

△   Move arrow cursor to the previous item.

▽   Move arrow cursor to the next item.

◁   If the arrow cursor is currently at a menu selection,
      (e.g. **RESOLUTION: > HIGH**),
      pressing the left button will cycle the value backwards,
      (e.g. to **RESOLUTION: > MEDIUM**),

▷   If the arrow cursor is currently at a menu selection
      (e.g. **RESOLUTION: > LOW**),
      pressing the right button will cycle the value forwards,
      (e.g. to **RESOLUTION: > MEDIUM**).

      If the arrow cursor is currently at a sub-menu title
      (e.g. **> OTHER OPTIONS**).
      pressing the right button will enter this sub-menu.

The **MENU EXIT** Key on the X201 reviewer will exit the current menu and move back up 1 level in the menu system when pressed. If already at the top level of the menu pressing this key will exit the menu system completely and return to the video switcher.

Once in the menu system the numbered keys are used for inputting data into fields which require a user entry such as times and dates.
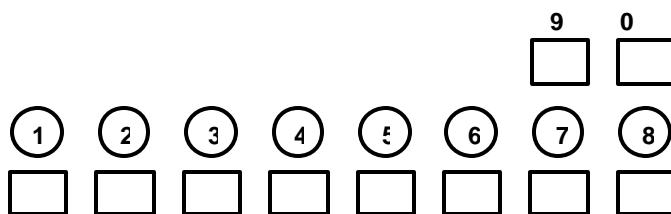
Playback & Recording

◁◁   ◁   □   ▷   ▷▷   ○
☐   ☐   ☐   ☐   ☐   ☐
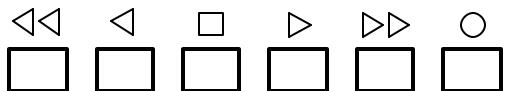
◁◁   **Rewind** through recorded footage. The normal wind interval is 1 minute. Pressing the
button again increases the wind interval to 5 minutes. Repeated presses increase the
interval to 10 / 20 and finally 60 minutes. This rapid scan mode enables fast, flicker-
free searching through recorded material. If the LED above the stop button is lit the
unit is in jog mode and the rewind button will rewind through recorded footage image
by image, with intervals of 1 minute.

◁   **Reverse-play** through recordings. If the LED above the stop button is lit (jog mode),
the reverse-play button will jog to the previous keyframe. If the oldest keyframe has
been reached, reverse playback will stop. Note that reverse play only operates on
images that have been first played in a forward direction.

□   **Stop** playback. If playback is already stopped, pressing this button again lights the LED
above and the unit is in jog mode, allowing image-by-image playback.

▷   **Play** recorded footage. Pressing play for a second time switches to fast play enabling
all the footage to be played through at the fastest rate. If the LED above the stop button
is lit, the play button will jog to the next image. If the most recent image has been
reached, playback will stop.

▷▷   **Fast-forward** through recorded footage. If the LED above the stop button is lit the unit
is in jog mode and pressing the fast-forward button will jog forward. Similarly to rewind,
repeated presses of the fast forward enable rapid scan in 5 / 10 / 20 / 60 minute
intervals.

○   **Record** start or stop. If not currently recording (red LED off), pressing this button will
begin recording from the end of the most recent footage, using the settings specified in
the Normal Recording menu (see page). If the unit is currently recording (red LED on),
this button will stop recording.

Camera Switcher

1	2	3	4	5	6	7	8

| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

| AUTO | 9-16 |

| | |
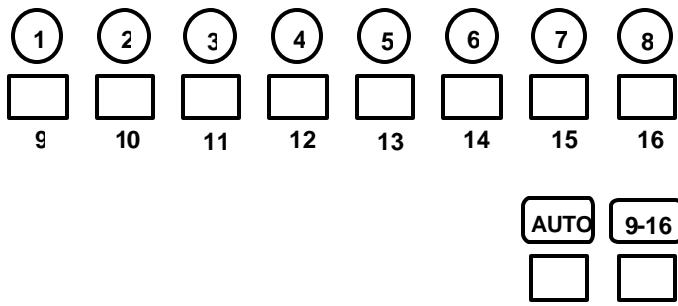
1-8   Switch the view to camera 1 to 8. When playing back recorded footage, pressing buttons 1 to 8 changes playback to that camera. If the AUTO LED is lit, buttons 1 to 8 change the live camera being viewed. This camera is held on the main monitor.

9-16   Press this button before pressing the number buttons 1-8 to access cameras 9-16 on the X200-16.

AUTO   Activate the auto switcher mode. In this mode, the monitor will show a live view and the cameras are cycled as specified in the "Video Switcher" menu. Press the AUTO button again to deactivate the auto switcher mode. If any of the buttons numbered 1-8 (or 9-16) are pressed while in auto switcher mode, the camera switching is stopped, and the selected camera view is held on screen.

Control of the auto switcher does not affect any recording in progress.

Search & Help

SEARCH

9 **0**

⬚ ⬚

```
9–16
```

⬚

HELP

HELP Applies when using any menu. Pressing this button will produce a help screen.
Continue pressing any key to cycle through help screens until menu returns.

SEARCH Go to a specific time and date in the recorded footage. Pressing this button will
enter the PLAYBACK SEARCH screen as seen below . If the footage on a given
camera cannot be found (it may not have been recorded), a "NO FOOTAGE FOR
SELECTED CAMERA" message will be displayed.

```
                 PLAYBACK SEARCH


     TIME :          00 : 00
     DATE :          00 / 00 / 00

     PLAY FROM SET TIME DATE

     PLAY OLDEST
     PLAY NEWEST



     PRESS MENU EXIT TO EXIT MENU
```

- **TIME –** Use the number keys to enter a time in 24hr format.

- **DATE –** Use the number keys to enter a date in the format DD/MM/YY.

- **PLAY FROM SET TIME DATE** – Plays the footage beginning from the time and date
  entered. If there is no footage at the time specified a jump is made to the nearest footage to
  the time given.

- **PLAY OLDEST –** Plays the oldest available footage on the Hard Disk Cartridge.

- **PLAY NEWEST –** Plays the most recent footage available on the Hard Disk Cartridge.

Audio

The X201 Reviewer can also be used for audio playback through its built in speaker. It must be noted that at present playback via the X201 is in mono via channel 1 only.

The audio signal from the X200 is transferred along with the video signal via the reviewer cable to the X201. No other cabling is required.

The speaker is located on the rear panel of the X201 reviewer and a headphone output jack is located on the bottom panel. Volume can be controlled via a trimmer pot located next to the headphone output jack. Very little force and the correct trimmer tool must be used with the volume control to avoid possible damage to the trimmer pot.

USB INTERFACE KIT

Transferring Files to PC

Any disk removed from the X200 recorder can be viewed on a PC and recording files (proprietary form at .xba files) are displayed. The disk is connected to the PC using an IDE / USB interface:

Interface	Details	Product code
IDE/USB	Easy connection; 12Mbit/sec transfer rate is adequate for PCLink200 playback	T503-USB

No additional device drivers are required for the USB Interface Kit when using Windows 2000 or XP. Additional device drivers supplied with the USB Interface Kit will need to be installed if using Windows 98 or Millennium. The USB interface is not compatible with Windows 95 or NT.

Connecting to a PC using the USB Interface Kit

To connect a T401-series Hard Disk Cartridge to a PC via USB you will require a USB Interface Kit which is supplied with the necessary lead, external cartridge power supply, PCLink200 software and Windows drivers.

1)   Remove the Hard Disk Cartridge from the X200.
2)   Use the T401-PSU to supply power from a mains outlet to the 5V DC input on the rear of the cartridge and slide the power switch on the front of the cartridge to the on position.
3)   Wait for approximately 5 seconds until the LED on the front of the cartridge settles to a steady green colour.
4)   Plug the multi-pin D shaped IDE USB lead into the rear of the cartridge and then plug the smaller USB connector into an available USB port on the PC.

Once the disk has been connected, the PC should take a few seconds to detect the disk and will then automatically assign a drive letter to it. Recording files can now be viewed by accessing the new drive letter using Windows Explorer or loaded directly from PCLink200 by using the 'Load XBA file', 'Load XBA folder' or 'Cartridge Autoload' options.

Installing USB Interface Kit Drivers (Windows 98 and ME Only)

The USB / IDE Interface Drivers only need to be installed when running Windows 98 and ME. It is strongly advised that the supplied drivers are not installed when running Windows 2000 and XP as they already have appropriate drivers as part of the original Operating System installation. Windows 95 and NT are not compatible with the USB Interface Kit.

1   Plug the T401-PSU Mains to 5VDC Power Adaptor into an available mains socket and connect the DC output jack to the 'DC5V' socket on the rear of the Hard Disk Cartridge. Switch the cartridge power switch to the 'ON' position. The Power LED will flash amber and then turn green.

           Please note that in cases where an available mains outlet is not available the PS / 2 Power Lead can be connected in-line with the mouse cord connected to the PC and to the 'DC5V' socket on the rear of the cartridge. This is not the preferred option as some PC's do not supply enough power from the mouse connection for the correct operation of the Hard Disk Cartridge. If the Power LED on the front of the cartridge remains amber and the cartridge is not working correctly then the T401-PSU must be used.

2   Connect the IDE end of the USB / IDE Interface Lead to the Hard Disk Cartridge and the USB end to an available USB port on the PC.

3   Windows should automatically detect the new hardware. Select 'Cancel'.

4   Insert the USB / IDE Driver CDROM version CD50.4. Use Windows explorer to open the directory 'USBIDE(ISD)' and then open the directory '98&ME'. Select and run the file 'TPPINST_5_04'. Follow the onscreen instructions to install the drivers.

5   Select and run the file 'setup.exe' from the CDROM and follow the onscreen instructions.

PCLink200 software can now be installed from its installation CDROM and used to review and archive footage from a Hard Disk Cartridge. Once PCLink200 has been installed a Hard Disk Cartridge can be connected to the PC by following steps 1 and 2 as described above.

Windows automatically detects and assigns the connected cartridge a drive letter and the drive can be accessed as per normal in Windows Explorer. If Windows has a problem locating a driver or accessing the drive then please refer to the relevant Windows update site and check that all the necessary components for USB compatibility are installed. Windows XP in particular requires at least Service Pack 1 to have been installed and may require further updates for USB compatibility.

PCLINK200 REVIEWING AND ARCHIVING SOFTWARE

Accessing / Storing Images

Introduction

PCLink200 is a Windows based application that allows .xba files to be viewed on a PC. These files are automatically created by the X200 recorder on its removable disk cartridge. The cartridge must be connected to the PC to access the files on the cartridge.

Playback options include play, forward-wind, rewind, jog control, jump to markers, time line jumping and stop.

Screen shots can be written to the Windows clipboard and pasted into most art packages in the BMP (Windows standard) image file format or saved directly to a BMP format disk file.

Sections of video footage can be selected and exported directly to an independent .avi disk file

Minimum Hardware Requirements

PCLink200 runs on Windows 98SE, Millennium, 2000 & XP.

It is recommended that the minimum hardware requirement is a 2GHz Pentium processor, 256MByte RAM, USB2 for optimum playback speed.

Installation

PCLink200 is a utility allowing the user to review and export .xba video footage created using the X200 digital video recorder.

To install the software insert the PCLink200 CD ROM into your computers CD ROM drive. In most cases the installation program will run automatically. If this does not happen use Windows explorer to select the CD ROM drive and the installer will start.

Starting

To start running PCLink200 click Start on the bottom left of the Windows screen and then follow **Start>Programs>PCLink200 >PCLink200**. Note that this location is only valid if the default settings were used during installation.

Installing Cartridge

Remove cartridge with recordings by unlocking slider on front of cartridge and pulling from the recorder.

To access recordings on cartridge, take to PC with PCLink200 already installed on PC. Connect cartridge to PC using USB Interface Kit and provide power to the cartridge with the supplied 5V dc power supply. Switch the cartridge power switch to the on position.

Windows should after a few seconds list the Hard Disk Cartridge as a new drive and automatically assign it with a drive letter.

Please refer to the USB Interface Kit section of this manual for detailed instructions on installing and using the USB Interface Kit.

Operating

Loading .xba files can be accomplished in a number of ways.

1. If "Cartridge Autoload" has been selected in the Options menu the user will be asked if they want to load all footage from a Hard Disk Cartridge which is attached to the PC before or after PCLink200 is started (V1.0.1 onwards). If this option is checked when PCLink200 is running it will look for an attached cartridge and ask the user if they want to load all of the .xba files on the cartridge.

2. "Load XBA file" from the file menu. This will display a file selection box and allow a single .xba file to be selected and loaded.

3. "Load XBA folder" from the file menu. This will display a file selection box and allow the selection of a folder containing multiple .xba files. If the entire contents of a cartridge is to be loaded then the drive letter of the cartridge should be selected. Pressing 'OK' will then load the entire contents of the folder or cartridge into PCLink200.

4. .xba files or folders containing .xba files can be dragged from a Windows Explorer window and dropped onto the main area of the PCLink200 window (V1.0.1 onwards).

User Interface Quick Reference

Menu bar

Shortcut icons

Double Clicking on a camera window will select it as full screen. Click again to return to multiple camera view.

The red border indicates the currently selected camera window.

The current playback speed can be adjusted by selecting from 0.1 to 10 times normal.

The date and time of the currently displayed footage.

Playback control buttons

Camera number.

GPS position and speed data.

Time and date information.

IPS information.

Footage position markers. These mark the start and end of selected footage. They can be moved by clicking and holding down the left mouse button.

PC system resources indicator.

The timeline shows areas of available footage in green. This can be scaled to show footage over appropriate periods of time.

The playback position marker can be moved to a specific date and time by clicking and holding the left mouse button.

File Menu

- Load single or multiple XBA files
- Print the currently selected camera screen
- Copy current camera screen to clipboard as a Windows bitmap
- Export current camera screen as a Windows bitmap
- Export video between start and end markers as either XBA or AVI
- Bring up a list of recently viewed XBA files
- View the properties of the current XBA file
- Exit PCLink200

Selecting cameras to view

- Use the View Menu to select which cameras are to be viewed

- Select the camera number from the drop down list

- Ticked cameras are displayed

- Camera numbers in grey indicate that no footage is available for that camera

Menu and Toolbar

Load XBA folder
File Properties
Copy Image
Export Image
Export Video
Print Image(s)
Show All Cameras
Zoom To Selected Cameras
About PCLink200

Play Controls and Timeline

Volume Control
Current Date and Time
Playback Speed
Start Marker
Current Playback Position
End Marker

Rewind
Stop
Play
Jog Back
Jog Forward
F Forward
Timeline Scale
System Resources Indicator
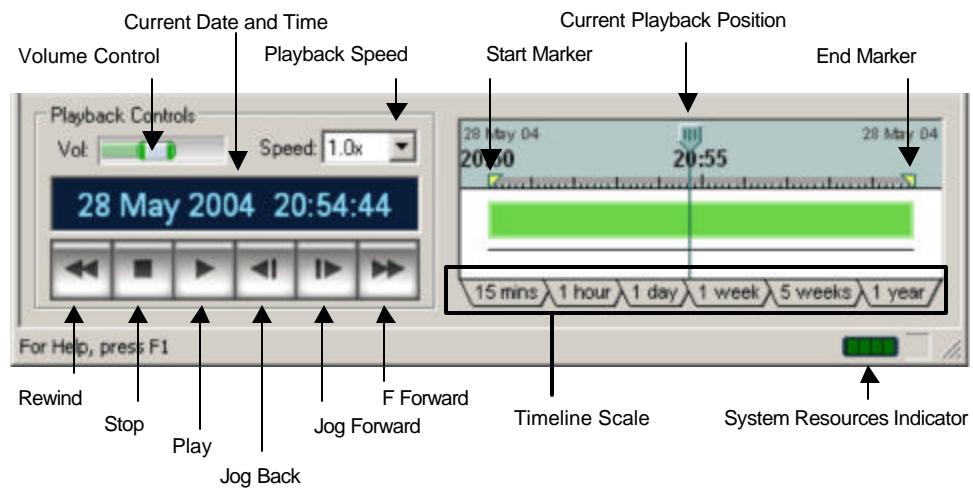
User Interface in Detail

Play Controls

The Play controls are situated in the bottom left hand corner of the PCLink200 window .
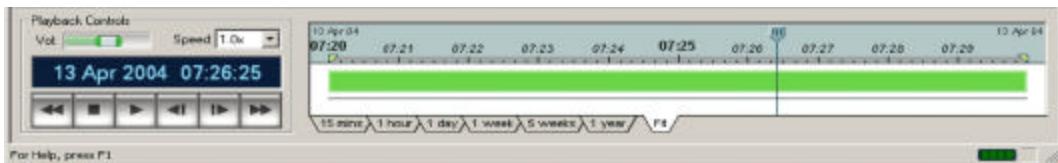
- **Rewind –** click once to rewind the footage by a few seconds whilst playing or stopped. Hold down to fast rewind the footage. The size and speed of this rewind is relative to the amount you are zoomed in.
- **Stop –** Click once to stop the footage at any time.
- **Play –** Click once to play footage. If clicked whilst footage is playing the play button will stop the footage.
- **Jog back –** Click once to rewind the footage by 1 second (to the nearest available keyframe) whilst playing or stopped.
- **Jog forwards –** Click once to advance the footage by 2 images whilst stopped.
- **Fast forward –** click once to advance the footage by 5 seconds whilst stopped. Hold down to fast forward the footage whilst playing or stopped.

Additionally the space bar on the keyboard may be used to toggle the footage between playing and stopped.

Playback Speed Selector

Just above the play controls is the Playback speed selector. This allows the footage to be played back from between 0.1 and 10 times its normal playback speed. Please note that at higher playback speeds than 1 times the smoothness of playback will be affected by the size of the footage window and the host PC's processing capability.

In order to optimise the PC's ability to play back footage at faster than 1x, it is advisable to shut down any other programs that are currently running and which may be utilising some of the system resources. If there is no audio present on the recording then it is also advisable to disable audio playback (selected in the Audio Menu) so that playback speed is maximised.

Volume Control

To the left of the Playback Speed Selector is the volume control. Slide to the right and left to increase and decrease playback volume respectively. Please note that when audio is disabled in the Audio Menu the volume control will be hidden.

Timeline

To the right of the play controls is the Timeline. This can be used to select and view the footage at a particular point in time. Click once on this bar and the footage will jump to this time, the bar can also be dragged by holding down the mouse button. The two yellow triangles at the beginning and end of the timeline are the start and end markers. By default these will appear at the start and end of the available footage when it is loaded, but they can be dragged by holding down the left mouse button to other points of the footage if desired. This is useful when using the 'Export video' option on the File menu, which exports section of footage between these two markers.

Below the timeline are a series of buttons used to select the scale of the timeline. This can be selected to cover from 15 minutes to 1 year; the 'Fit' option scales the timeline to cover all of the currently loaded footage from beginning to end.

Time and Date

The current time and date of the footage shown on the screen is displayed directly above the play controls.

Main menu and Toolbar.

There are a number of menus available in the main menu bar across the top of the PCLink200 window. There are also a number of icons on the Toolbar below the menus.
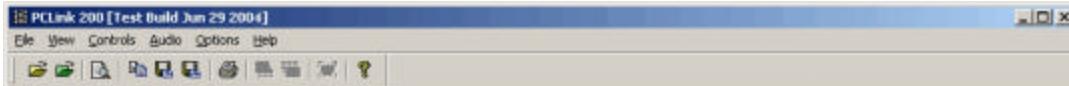
File Menu.

Load XBA file – Opens a single .xba file from a user specified location. Select the file and press open.

Load XBA folder – Opens a group of .xba files from a user specified folder. Select the file and press open. This can also be used to load all the files from a cartridge connected to the PC. To do this select the drive letter in My Computer assigned to the cartridge and press open. All of the available footage from the cartridge will then be loaded.

Print – Prints the currently selected camera view.

Copy Image – Copies the currently selected camera view to the clipboard in Windows Bitmap format.

Export Image – Exports the currently selected camera view as a Windows Bitmap to a location specified by the user.

Export Video – Exports the section of footage between the start and end markers as either a compressed or uncompressed AVI file. A dialog box will appear allowing the user to select the codec for compression (or uncompressed) and manually set the footage start and end times if desired. The camera selected for export can also be chosen from this dialog.

Recent Files – Displays a drop-down list of recently opened .xba files, click on an item to load the file. Please note that this will not work if the file has been moved since it was last opened.

Properties – Brings up a summary of the current .xba file properties such as start/end times and file size.

Exit – Exits the PCLink200 program.

View menu.

Toolbar / Status Bar – These can be checked or unchecked to either view or hide the Toolbar and Status Bar in the PCLink200 window.

Cameras – This will display a drop-down list of cameras. Either check or un-check each camera to determine whether it is currently displayed or not displayed in the PCLink200 window. Cameras with available footage will have their number displayed in black, all others will be displayed in grey and are not accessible.

Additionally double left-clicking on any displayed camera window in a multiple camera view will display it full screen. Left-clicking again will revert back to a multiple camera view. Multiple camera views can be selected by holding down the Ctrl key whilst left clicking on the desired camera windows (V1.0.1 onwards). If multiple camera windows are selected then double left clicking whilst holding down the Ctrl key will display only the selected cameras, left clicking any part of the grey area of the PCLink200 window will revert to all camera windows being displayed.

Show Selected Cameras – This will display all of the currently checked cameras in the Camera list.

Show All Cameras – This will display all cameras for which there is available footage.

Controls menu.

Play / Stop – This will toggle the footage from playing to stopped and vice-versa. Also controlled directly by the **Space Bar** on the keyboard.

Jog Forwards – Causes the footage to jog forwards. Also controlled directly by the **L** key on the keyboard.

Jog Backwards – Causes the footage to jog backwards. Also controlled directly by the **J** key on the keyboard.

Jump to Start Marker – Causes the footage to jump to the start marker. Also directly controlled by the **I** key on the keyboard.

Jump to End Marker – Causes the footage to jump to the end marker. Also directly controlled by the **O** key on the keyboard.

Jump to – Brings up a dialog box allowing the user to input a time and date to jump to. If no footage is present at the selected time and date then the nearest footage will be selected. The jump to dialog can also be brought up by left clicking on the time and date display above the play controls.

Audio menu.

Audio Enabled – Enables audio playback on both channels.
Left Channel Only – Enables audio playback on the left channel (channel 1) only.
Right Channel Only – Enables audio playback on the right channel (channel 2) only.
Audio Disabled – Disables audio playback (Mute).

Options menu.

Cartridge Autoload – Check this option to autoload all footage from a Hard Disk Cartridge which is attached to the PC before or after PCLink200 is started (V1.0.1 onwards). If this option is checked when PCLink200 is running it will look for an attached cartridge and ask the user if they want to load all of the .xba files on the cartridge.

Passwords – Allows the user to set passwords for operation of PCLink200 or just the export function. The password is blank spaces by default and setting it back to this will remove any password protection. When changing passwords the user will be prompted for the old password before a new one can be entered.

Preferences – This brings up a menu allowing the user to specify a number of display and export preferences.

Help menu.

Access to the Help Menu and information about PCLink200.

Toolbar

There are a number of icons on the toolbar which mirror functions from the menu.

Open XBA file

Open XBA folder

Displays properties for all the currently loaded .xba files. It also highlights the file currently playing and allows the user to double-click files to jump to their start times

Copy current image to clipboard

Export current image

Export video between start and end markers

Print current image

Show all cam eras

Zoom to selected cameras

Change watermark position

About PCLink200

REMOTE OPERATION

The X200 includes Ethernet local area connection (LAN) technology. It also incorporates a TFTP (trivial file transfer protocol) server which allows the video files to be downloaded using either a hard-wired or wireless network connection. The files can be accessed and downloaded using any TFTP client application such as Timespace Technology's X-Communicate software.

LAN

Introduction

This document is intended to provide an introduction to the networking facilities provided by the X200 Digital Video Recorder and to assist with the configuration and interoperation between it and other networked computers.

Connection to the X200 built-in 10Mb/s Ethernet network adapter is via a standard RJ45 socket and from this a connection can be hardwired or via a wireless bridge device such as the Netgear ME101.

Configuration

Configuration of the X200 networking parameters is done via the menu system accessed using a X201 reviewer. The LAN (local area network) menu option presents the user with fields which allow the IP address, the subnet mask and the default gateway values to be set. It also allows the user to interrogate the unit's unique MAC address.
The X200 LAN menu page is similar to that shown below:

```
         |  LAN  |


  IP ADDRESS:  > 10.  0.  0.  1

  SUBNET MASK:  255.255.255.  0

  GATEWAY:       10.  0.  0.254

   PING TEST ...


  MAC:        00:0F:B4:00:0A:48
```
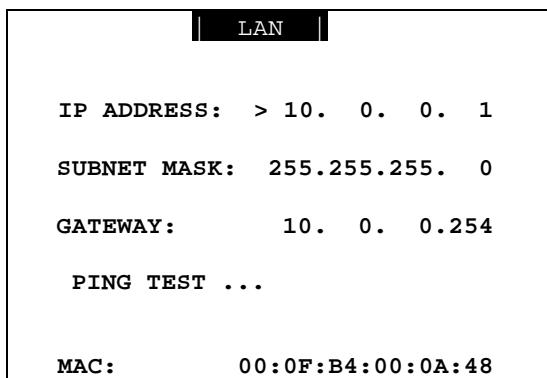
Unit MAC Address

All network devices include a unique media access control (MAC) address used to identify it on a network. The address is a 48 bit number, usually represented as 6 bytes – each byte written in hexadecimal notation.

[On the menu, each hexadecimal byte value is separated by a colon.]

All Timespace Technology devices have a MAC address which begins 00 0F B4 followed by another three bytes.

        e.g. 00 0F B4 00 0A 48

The X200 LAN menu option allows the user to display its MAC address which may be useful in configuring access control with wireless networks.

IP Address

For devices communicating on a network, messages must identify the source and destination with an address. The IP (internet protocol) address is a 32-bit number that uniquely identifies a device connected to the network and is usually represented in a dotted decimal form.

e.g. 10.0.0.28

[The IP addressing scheme is defined by the Internet Engineering Task Force (IETF) document RFC 791]

80

Subnet Mask

The subnet mask is used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address. Subnetting enables a network administrator to further divide the host part of the address into two or more subnets. In this case, a part of the host address is reserved to identify the particular subnet.
The subnet mask is the network address plus the bits reserved for identifying the subnetwork. (By convention, the bits for the network address are all set to 1.) As a mask, it can be used to identify the subnet to which an IP address belongs by performing a bitwise AND operation the mask and the IP address. The result is the subnetwork address.

Default Gateway

This is the address of the 'gateway' in a network that a computer will use to access another network if a gateway is not specified for use. In a network using subnets, it is the address of the router that forwards data traffic to a destination outside of the subnet of the transmitting device.

Ping Test ...

Selecting this option will bring up the 'ping test' menu which is similar to that shown below.
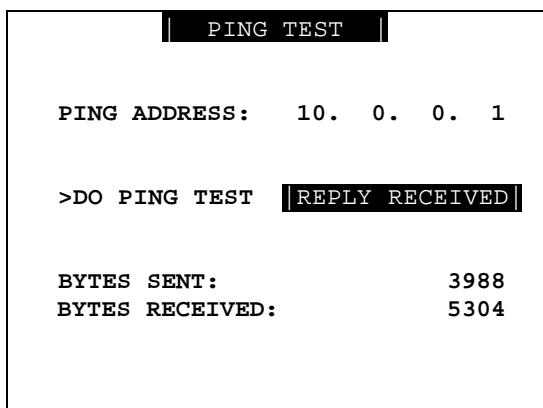
```
                   ▌  PING TEST  ▐


      PING ADDRESS:   10.  0.  0.  1


      >DO PING TEST  ▐REPLY RECEIVED▌


      BYTES SENT:               3988
      BYTES RECEIVED:           5304


```

Enter the destination IP address of the unit you want to test communication with on the ping address line and then select 'DO PING TEST ...'. If the destination receives the ping message and replies within 10 seconds then 'REPLY RECEIVED' is displayed; otherwise 'NO REPLY' is displayed.

[See the troubleshooting section for further details about 'ping' and instructions on how to initiate a communications test from a computer attached to the network.]

The 'BYTES SENT' and 'BYTES RECEIVED' fields update in real-time to show how many bytes are being transferred to and from the X200 and can provide further indication of data transfer.

WLAN

Wireless Ethernet Bridge

Connection

The X200 Digital Video Recorder is connected to a network via a standard RJ45 network socket. For a wireless LAN, a direct connection can be made from this port to a wireless bridge device (such as the Netgear ME101) using a cross-over cable (usually supplied with the wireless bridge.)

Configuration

Because wireless devices from different manufacturers provide different facilities, configuration is usually performed using a proprietary utility supplied with the device. The configuration process usually involves connecting the device to a network equipped PC and running the utility to set up the security and encryption settings. It will also be necessary to select the correct SSID (service set identifier) which is a 32 character string used to identify one wireless network from another. Refer to the installation guide included with the network bridge for more specific details.

Wireless Router

Configuration

Two standards are typically in use for the encryption of data transferred over a wireless network – WPA (wireless protected access) and the older legacy system; WEP (wired equivalent privacy). The use of either necessitates the configuration of all wireless devices employed on the network.

> *[Where problems are being experienced establishing connection between wireless network devices, it is recommended, where possible, to first establish reliable communication with encryption turned off.]*

WEP (Wired Equivalent P rivacy)

The WEP security standard uses a key (64 or 128 bits long) to encrypt and decrypt data sent over the wireless connection. All devices on the same network must be configured with the same key.

### WPA (Wireless Protected A ccess)

The WPA security standard uses a pass-phrase key to encrypt and decrypt data sent over the wireless connection to ensure privacy. All devices on the same network mus t be configured with the same key and encryption technique (TKIP or AES).

MAC Address Filtering

MAC address filtering is a security feature which allows you to specify which computers are allowed on your network. Any computer attempting to access the network that is not specified in the filter list will be denied access. When using this feature, the MAC address of each client must be added to the list in the router.

> *[It may be necessary to add both the MAC address of the X200 <u>and</u> the wireless bridge to which it is connected.]*

Typical X200 Wireless LAN Configuration
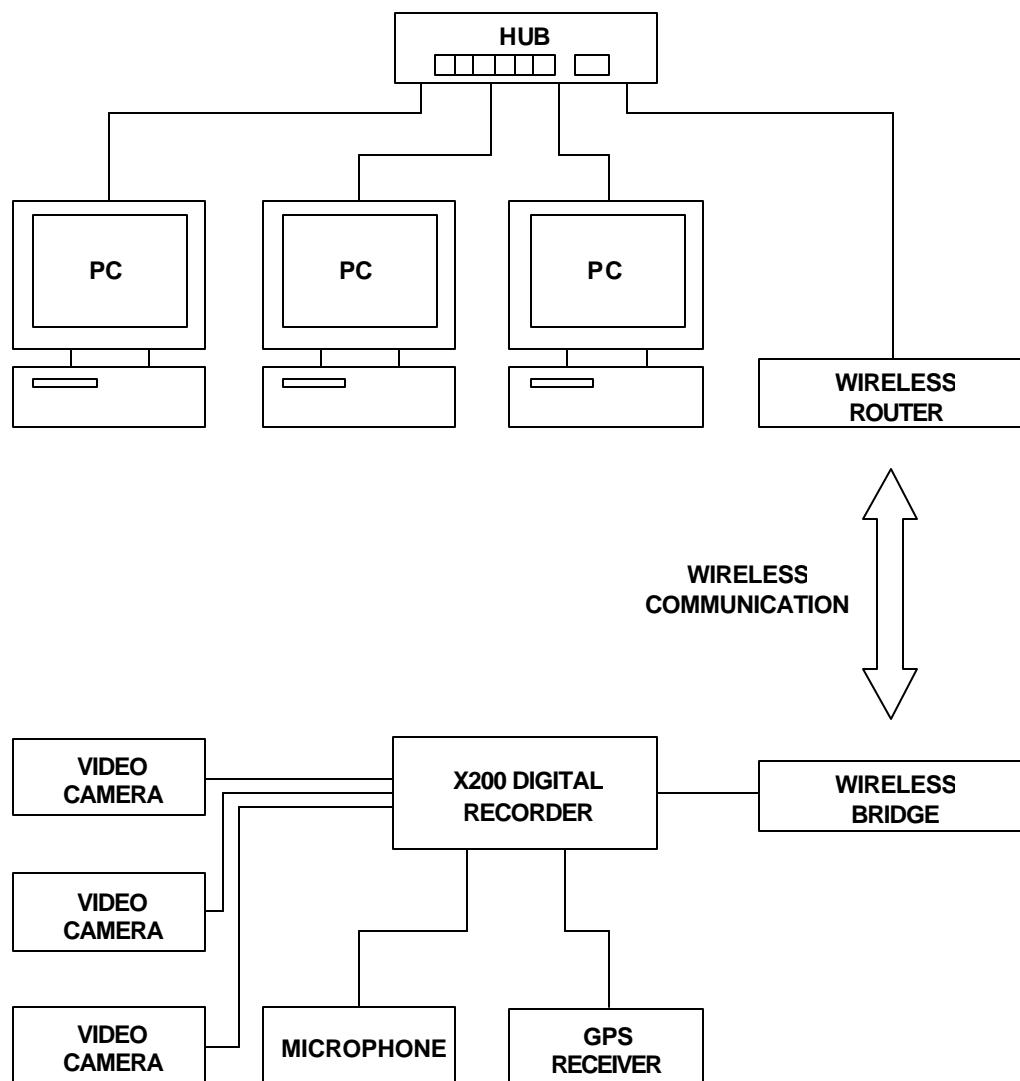
Troubleshooting

Hardwired Connection

If it is suspected that the wireless connection is causing problems, the X200 standard RJ45 socket allows connection to the network using a standard UTP network cable.

[Note that if a hardwired cable connection is made directly to a single computer then a cross-over cable may be necessary.]

Ping

The 'ping' utility is a software tool used to see if a network device is operating and also to see if connections to it are intact. A small packet of data is sent through the network to a particular IP address and the computer that sent the packet then waits (or 'listens') for a return packet. If the connections are good and the target is working, a good return packet will be received.

[Ping uses the Internet Control Message Protocol (ICMP) Echo function which is detailed in RFC 792.]

The 'ping' utility is provided in versions of the Microsoft® Windows® operating system. It can be run by following the instructions below:

- Press the 'Start' button.

- From the menu, select 'Run...'

- In the dialog window type command where it says Open.

- When the command window opens, at the prompt type ping followed by the IP address of the device to be tested. In the example below the IP address of the unit being tested is 10.0.0.3 and the unit is replying. If no response is received the ping application will display 'Request timed out.'

Operation

Single Client

The X200 Digital Video Recorder will allow file download to one client at a time. During file transfer, any attempt by another client to download a file will be rejected or ignored. A transfer can be explicitly aborted with a Timespace extension to the TFTP protocol and implicitly aborted if no acknowledgement is received in response to a data packet within 20 seconds.

TFTP

TFTP (trivial file transfer protocol) is a simple protocol used to transfer files. The X200 Digital Video Recorder includes a TFTP server which follows the protocol as described in the following documents:

- The basic TFTP protocol   RFC 1350
- TFTP option extension   RFC 2347 (1782)
- Block size option   RFC 2348 (1783)
- Time-out and transfer size options   RFC 2349 (1784)

Timespace Extensions

While the X200 implementation of the trivial file transfer protocol follows the standards closely, it extends upon it to allow the client to interrogate the files stored locally in the recorder. These extensions are:

- Explicit transfer abort
- Directory listing request

Explicit Transfer Abort

Since the X200 Digital Video Recorder only supports transfers to one client at a time, provision has been made to abort a transfer should either client or source become unable to continue.
- The X200 will assume that a data transfer has been aborted if no acknowledgement is received in response to a data packet within 20 seconds.
- The X200 will abort a transfer currently in progress if it receives an ABORT command (op code 7). This will allow the same (or another) client to initiate a new transfer.

Directory Listing Request

The standard TFTP read request (RRQ) packet takes the following form:

2 bytes	*string*	*1 byte*	*string*	*1 byte*
Op Code (1)	Filename	0	Mode	0

The Timespace Technology implementation of TFTP on the X200 responds to read request packets where the *Filename* is either `dir` or `dir,n` (where n is an integer used to identify the index into the directory listing). The response to such a request is a packet containing information about the requested directory entry in the following form:

```
iii/nnn?lllllllllllllllllllllllllll?sssssssssss?ccccccc?mmmmmmmm?zzzzzzzz
```

where the fields are separated by tab characters (?) and they represent:

> *i* - the index number of the file in the X200 directory
> *n* - the total number of files in the X200 directory
> *l* - the long filename
> *s* - the short filename
> *c* - the creation time and date
> *m* - the modification time and date
> *z* - the file size in bytes.

Data Transfer

Transfer Rate

The X200 Digital Video Recorder is equipped with a 10Mb/s network interface controller and this could be a limiting factor when using with a wireless LAN connection. Current wireless standards include:

- IEEE 802.11g – provides networking with speeds up to 54Mb/s
- IEEE 802.11b – provides networking with speeds up to 11Mb/s

where these are maximum rates. In practice, the rate adapts according to the S/N (signal to noise ratio) and the signal strength – the further apart the two communicating wireless devices, the lower the transfer data rate.

Transfer Range

The IEEE 802.11b standard limits the radiated power to 0.5W and in general a range of up to 100m is considered possible when there are no obstructions. Besides distance, performance can be degraded by radio interference, humidity, air temperature, resource contention (if many devices are accessing the wireless network simultaneously) and objects that block the signal.

Antenna

Antennas direct Radio Frequency (RF) power into a coverage area. Antennas are available which produce differing coverage patterns and to maximize the transmission range, the design of the antenna connected to your card is crucial. The majority of supplied antennas are omni-directional - that is, they radiate energy more or less equally in all directions. The correct antenna for a site is chosen by determining the antenna that provides the coverage pattern best matched to the site coverage requirements. If the supplied antenna is replaced with a directional antenna then a range of up to 3km or more may be possible although this will be limited again by any obstructions.

The increase in coverage within the RF beam width is called the antenna gain, and is measured in dB (decibels). Antenna gain improves the range of the signal for better communications (for both transmission and reception). As a general rule of thumb, each 1 dB increase in antenna gain can result in a range increase of 2.5% indoors or 5% outdoors. Actual results will vary depending on the amount and type of obstructions at the site.

Channels

The 802.11 standard defines a number of channels which operate at different frequencies in the 2.4GHz spectrum. However, the spectrum allocation means that many of these channels overlap. Additionally, interference from other devices in the 2.4GHz spectrum, such as wireless phones, bluetooth devices and microwave ovens, can make that part of the airwaves quite crowded.

Channel	Lower Frequency (GHz)	Central Frequency (GHz)	Upper Frequency (GHz)
1	2.401	2.412	2.423
2	2.404	2.417	2.428
3	2.411	2.422	2.433
4	2.416	2.427	2.438
5	2.421	2.432	2.443
6	2.426	2.437	2.448
7	2.431	2.442	2.453
8	2.436	2.447	2.458
9	2.441	2.452	2.463
10	2.446	2.457	2.468
11	2.451	2.462	2.473
12	2.456	2.467	2.478
13	2.461	2.472	2.483
14	2.473	2.484	2.495

Improving Transfer Range

The following tips may help in increasing the transfer range or the signal strength and signal to noise ratio which can help improve the transfer rate.

- Put the router or access point close to the centre of the area to cover.

- Reduce the distance between the wireless devices.

- Keep wireless devices in line of sight, as much as possible.

- Place routers and access points high, and as clear of obstructions as practical. Try to keep antennas at least a metre away from metal fixtures. Note that antennas on roofs do not necessarily give the best results.

- Keep routers, access points, and antennas away from large amounts of water such as fish tanks and water coolers.

- Put routers and access points near windows only if you want to communicate between buildings.

- Avoid the weaker signals heading downward from routers and access points.

- If there is a removable antenna, make sure it is fastened securely.

- For outdoor mounting of antennas note that the coax RF cable should be kept as short as possible to minimize RF loss. Note that the length of cable that comes with the antenna is often optimized.

- Put antennas as close to vertical as practical.

- If there are possible interfering devices nearby (such as mobile phones or microwave ovens) try changing the equipment to use another channel.

- If there are more than one wireless routers in range of each other, space the channels out as much as possible. E.g., for two routers, choose channels 1 and 11. For three routers choose 1, 6, and 11.

- Use access points in areas without coverage.

- In highly critical situations professional installers may be able to help by doing a site survey and following professional installation processes.

Glossary

Bridge	A device which forwards traffic between network segments based on data link layer information.
ICMP	Internet Control Message Protocol
IP	Internet Protocol
LAN	Local Area Network
MAC	Media Access Control
Ping	A software application used to determine whether two network devices are capable of communication.
R F	Radio Frequency
Router	A device in a network that handles message transfer between computers.
SSID	Service Set Identifier
S/N	Signal to Noise Ratio
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
UTP	Unshielded Twisted Pair
WEP	Wired Equivalent Privacy
WPA	Wireless Protected Access
WLAN	Wireless Local Area Network

X-Communicate LAN/WLAN File Transfer Software

Introduction

The X200 Digital Video Recorder includes Ethernet local area networking (LAN) technology. It also incorporates a TFTP (trivial file transfer protocol) server which allows the stored video files to be downloaded using either a hard-wired, or wireless, network connection. The files can be accessed and downloaded using any TFTP client application.

X-Communicate is a simple TFTP client application which runs under the Windows operating system to allow the listing and transfer of files from the X200. The screenshot below shows how the application appears during file download.
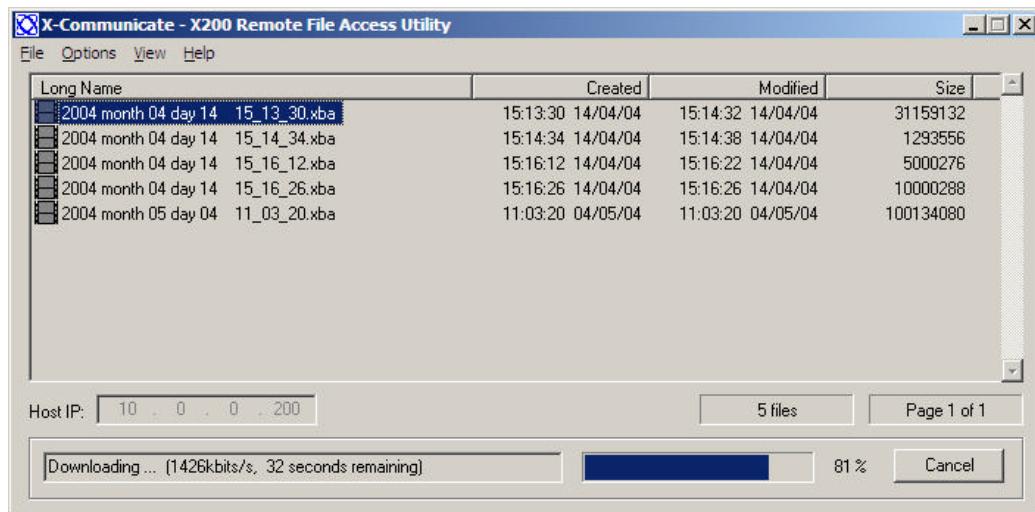
Quick Start

To download a video file from an X200 follow the steps below:

- Start the X-Communicate application

- Enter the X200 IP address in the host IP address field.

- Wait until communication has been established (files displayed).

- Select the required file (scrolling through the pages if necessary)

- From the menu, select File and then Download.

- Select a local name for the transferred file.

- Wait as the file is transferred.

Operation

The screenshot below shows the main areas of the X-Communicate application.
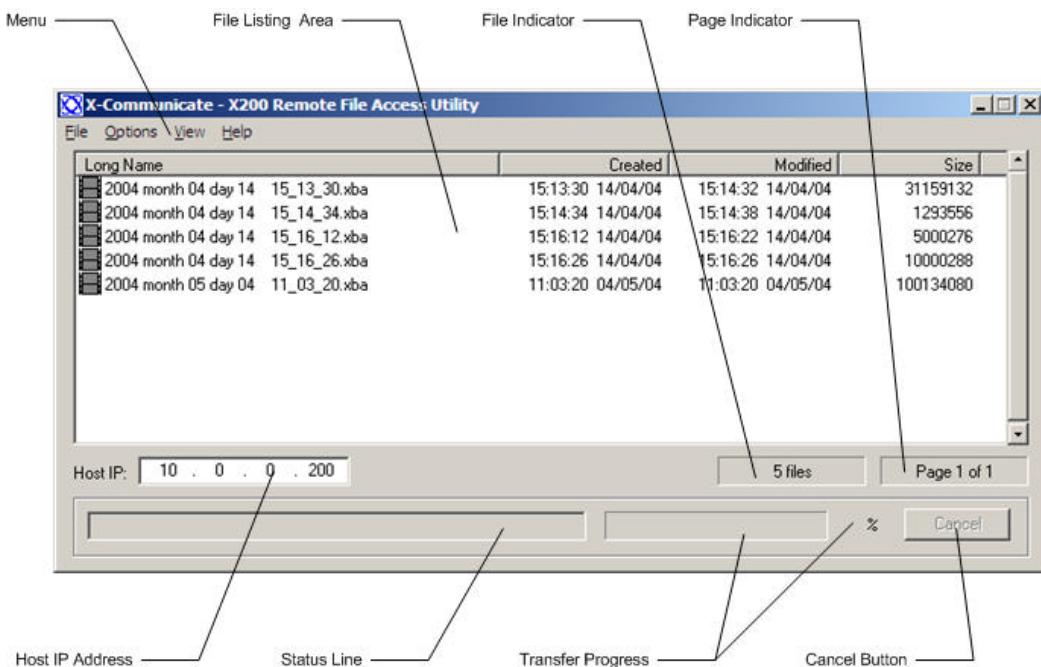
Menu

The menu allows the user to configure and control the X-Communicate application. Each of the menus and options are detailed below:

File

Download

This menu selection is enabled when a file has been selected (highlighted) in the File Listing Area. When selected, a dialog is displayed which prompts the user to select the name of the file to be used locally. By default, the same filename as on the X200 is displayed.

If the file with the same already exists then the user is prompted to confirm that it is their intention to overwrite that file. Note that it is also possible to initiate a file download by double clicking the required file in the File Listing Area.

Exit

Selecting this option closes the X-Communicate application.

Options

Multiple Acks

File download from the X200 using TFTP is accomplished by the transfer of a number of blocks, each of which is acknowledged before the next is sent. To speed up transfer, the protocol permits a number of blocks to be in transit which have not been explicitly acknowledged. This approach can improve transfer rates and so the default is for it to be selected.

1024byte Blocks
The X200 implementation of the file transfer protocol supports different size blocks. If this option is selected then blocks of 1024 bytes will be transferred; if it is deselected then the files will be transferred in blocks of 512 bytes. In general, the larger block size will incur less overhead if the transfer of data is reliable and so will give better transfer rates; hence, this is the default.

View

Small Icons
Selecting this option displays the files on the X200 as small icons.

Icons
Selecting this option displays the files on the X200 as large icons.

List
Selecting this option displays the files on the X200 as a list.

Details
This view option is the default. Selecting it displays the files on the X200 with details including:

- Filename

- Creation Date and Time

- Modification Date and Time

- Size (in bytes)

Refresh
The X-Communicate application interrogates the number of files on an X200 when it firsts connects. To update the file listing, or to re-establish connection with an X200 which may have been temporarily disconnected, select this menu option.

Help

About
Selecting this option display a dialog window displaying the application name. The version of the application also appears in the dialog. In the example below, the version number is 1.2.

X-Communicate Window

File Listing Area

The file listing area displays the files stored on the remote X200 that are available for download. Using the menu View options, the files can be displayed as small icons, large icons, in a list or with details including creation and modification time and file size.
A file must be selected in the file listing area before it can be downloaded. Double-clicking a file will initiate the file transfer process.

Where more files are available than can be displayed in the file listing area, the vertical scrollbar to the right can be used to move between pages.

File Indicator

This field shows the number of files available for download on the remote X200 specified by the entered IP address.

Page Indicator

This field shows the current and total page numbers. Use the vertical scrollbar to the right of the File Listing Area to move between pages.

Host IP Address

Each device connected to a network must be configured with a unique IP address. Enter the IP address of the X200 you wish to connect to in order to download video files.

Status Line

Displays any status messages should the X-Communicate application be unable to connect to the specified X200 and also the transfer rate and time remaining during file download.

Transfer Progress

A progress bar and a percentage indicator update as a file is downloaded.

Cancel Button

During file transfer, the download can be aborted at any point by selecting the cancel button.

Glossary

IP	Internet Protocol
LAN	Local Area Network
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol

SPECIFICATIONS

X200 DIGITAL RECORDER

Video Recording

Max Rate	25ips PAL, 30ips NTSC, shared; selectable by camera
Resolution	Low, Medium, High, V.High
TVL	540
Pixels	720 x 288 PAL; 720 x 240 NTSC
Format	MPEG2 - full image update or optional conditional refresh
Input Signal	4 or 16 inputs; composite video 1 V p/p; colour/mono; PAL/NTSC autoswitching
Simultaneous Functions	Record, Playback, Live views, Ethernet
Recording Medium	2.5" IDE PC-compatible hard disk in customised cartridge
Recording Modes	Normal, timer, alarm, single/multi shot, loop or single pass
Alarm recordings	Post-trigger recording; show alarmed cameras live on video switcher
Timer recording	Weekly timer (7 day programmable) or interval timer, or both
Embedded Text	Camera number, date and time plus 12 user characters for each camera; GPS* speed and position

Audio recording

Type	Optional 2 line inputs; 2 line outputs;
Sampling Rate	16kHz
Sampling Res.	16 bits
Max Level	Selectable: 0.12V to 2V RMS (0.35V to 5.6V pk-pk)

Configuration

Entry	Menu system with help screens; accessed [with password] by X201 Reviewer
Password	4 user-definable levels
Language Options	English
Date Options	dd/mm/yy; mm/dd/yy
Summertime Correction	UK; Europe; USA; Off

File System

File Type	Proprietary ".xba", convertible [with password] to AVI
File Name	Optional file text plus date/time, for example:"Bus0034 2004 month 08 day 16 12_30_00. .xba"
File Size	10 min or 1 hour
File Protection	Write-protection via file menu; optional automatic write - protection of alarm recordings

Playback

Functions	Rewind, Replay, Stop, Play, Fast Forward, Jog mode
Image Search	Time/date or by file

Remote Operation*

Systems	Ethernet [LAN/WLAN*]
Functions	File transfer to PC

GPS*

Embedded Text	Position (coordinates) and speed (kph or mph)
GPS Data	Files contain GPS position/speed/time for mapping
Clock Lock	Locks X200 clock to world GPS clock

* Additional hardware required - not supplied by Timespace Technology

<u>Connections/Controls</u>

Connector Type	Cable harness (X200-16) Individual connectors (X200-04)
Video Inputs	16 on 25-way "D" connectors (X200-16) 4 x BNC (X200-04)
Video Out	1 on 25-way "D" connector (X200-16) 1 x BNC (X200-04)
Switcher Out	1 on 25-way "D" connector (X200-16)
Audio In	2 line on 25-way "D" connector (X200-16) 2 line on DIN 5 way audio socket (X200-04)
Audio Out	2 line on 25-way "D" connector (X200-16) 2 line on DIN 5 way audio socket (X200-04)
Alarm Inputs	4 on screw terminals
Alarm Output	1 on screw terminals
Power Inputs	2.5mm DC socket for PSU 1 x pair screw terminals, 12V
Modem and/or GPS	9-way "D" connector [RS232 serial]
LAN/WLAN	RJ45
Reviewer [X201]	RJ45
Record On/Off	Push button [menu disable]
Indicators LED	Power, Recording, Service, Fail
LED Out	2 x screw terminals for Recording LED and Service/Fail combined LED

General

Security	Proprietary files; password protection; fragile watermark every image [MD5+DES]; embedded camera text
Power [DC]	12V DC nominal (8V-13V DC max range);
External Mains PSU	Input: 100V-240V AC 50-60Hz
	Output: 12DC Regulated, 2A (continuous) 3A (peak)
Power Recording	0.95A, 12V (11.4W) (X201 connected)
Power Not Recording	0.83A, 12V (10W) (X201 connected) Peak Current 2.8A peak start up current @ 12V (X201 connected)
Power on until Recording	< 5 seconds
Clock	TCXO [+/- 1 min/year]; optional GPS locked clock*
Case	Mild steel, grey painted
Dimensions [mm]	210 x 112 x 47 (case)
Dimensions [mm]	220 x 116 x 52 (overall)
Weight	965g (without cartridge)
Environment	Indoor use
Operating Temp. Range	+5C to + 40C, 20% to 80% RH Storage Temp. Range -40C to +65C
Mounting	Free-standing or screw-mounted
Supplied Accessory	Instruction manual; PSU
Warranty	36 months

REMOVABLE HARD DISK CARTRIDGE

Access	X201 Reviewer; LAN/WLAN while in X200; PC using USB Interface Kit (see below)
Hard Disk	2.5" IDE
Power Requirement	5V 1A (PSU supplied with USB Interface Kit)
Dimensions [mm max.]	143 x 84 x 23
Weight	~ 200g depending on type
Warranty	30 months

X201 REVIEWER

Functions	Program menus, check camera views, review live or recorded images
Operation	22 tactile keys with LED indicators
Power	Powered by X200
Display	3" LCD monitor, TFT, 960[H]x234[V] pixels
Format	PAL/NTSC
Audio	Single channel via built-in speaker
Connectors	X200 interface: 8-way RJ45 [serial data; video; audio; DC supply]; headphone jack
Case	Aluminium, grey painted
Dimensions [mm]	218 x 148 x 52
Supplied Accessory	Data link cable (X200 to X201)
Warranty	36 months (monitor 12 months)

PCLINK200 REVIEWING/ARCHIVING SOFTWARE

Availability	Supplied in Interface Kits; software freely available to law enforcement agencies
Compatibility	Recordings made on X200 cartridges
Access	Cartridge or recordings on CD/DVD, PC hard disk (copied or LAN/WLAN uploaded files)
Operating Systems	Windows 98, ME, 2000, XP
Hardware Requirements	2GHz Pentium, 256MByte RAM, USB2 for optimum playback speed
Security	Optional password on PCLink200 software and on export video to AVI function
Language Options	English
Playback Controls	Rewind, jog back, stop, play and fast forward, jump to time, rapid shuttle via timeline.
Playback Speed	Varispeed x0.1, x0.2, x0.5, x1, x2, x3, x4, x6, x8, x10 realtime for rapid playback.
Functions	Realtime playback with audio
	Review archive files on single or multi screen display Copy 10 min or 1 hour files from cartridge to PC Copy images into Microsoft Word or other package
	Activate and verify watermarks
	Export video to AVI file

OTHER ACCESSORIES

<u>USB INTERFACE KIT</u>
For access to X200 recordings via USB1 or USB2 socket of PC; includes software, cables, instructions, PCLink200 reading software.

<u>ANTI-VIBRATION KIT</u>
Shock and vibration protection in mobile and portable applications.

TROUBLESHOOTING

Text Messages

The following messages may be displayed on the X200 reviewer under the circumstances described:

```
       MANUAL OVERRIDE ENABLED

You have chosen to override ALARM
recording and turn recording off.

To disable this manual override,
press the record key again, after
leaving this screen.



     PRESS ANY KEY TO CONTINUE
```
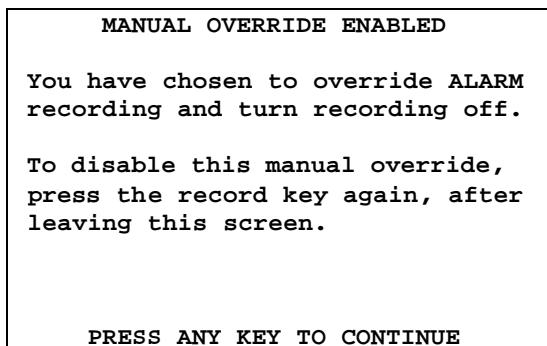
The above is displayed when the unit is configured for alarm recording and the record button is pressed which will override the configured mode. Press any key on the reviewer to clear the message.

```
       MANUAL OVERRIDE ENABLED

You have chosen to override TIMER
recording and turn recording off.

To disable this manual override,
press the record key again, after
leaving this screen.



     PRESS ANY KEY TO CONTINUE
```
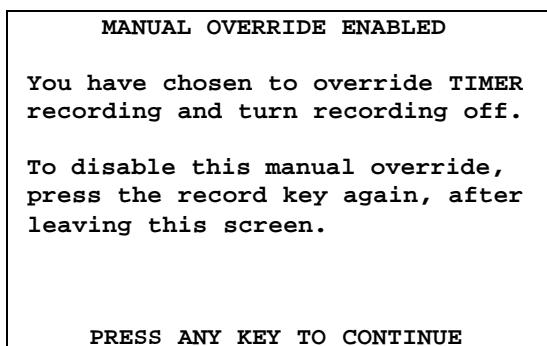
The above is displayed when the unit is configured for timer recording and the record button is pressed which will override the configured mode. Press any key on the reviewer to clear the message.

```
      MANUAL OVERRIDE DISABLED

Manual override is now OFF.






     PRESS ANY KEY TO CONTINUE
```
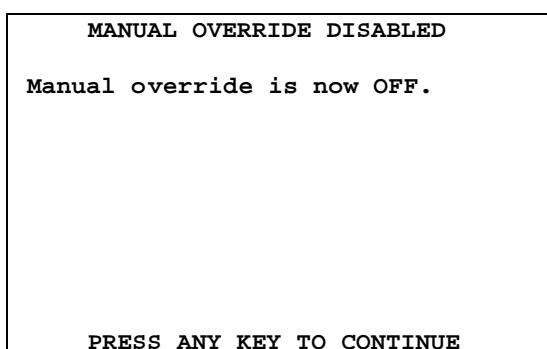
The above is displayed when manual override has been enabled and then subsequently disabled again. Press any key on the reviewer to clear the message.

```
                NO SIGNAL.
         CAMERA DISCONNECTED?
```
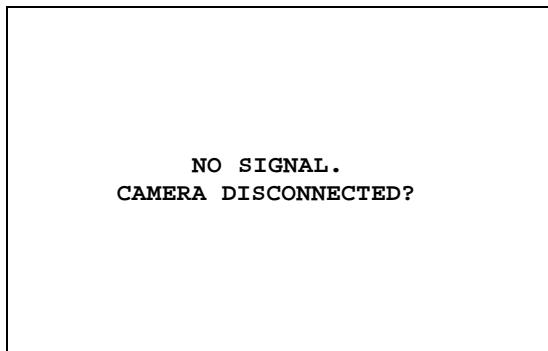
The above message is embedded within the recording file when the X200 video recorder detects that there is no video signal on an input selected for recording. Check that the camera is working and properly connected to the X200 should this message be seen unexpectedly in recordings.

Fail LED

Illuminated when the X200 video recorder is unable to make recordings. Check that the hard drive cartridge is properly inserted and locked in.

Service LED

Not currently used.

FAQ's

X200

"Does not record on power up"	Enter menu system; go to OTHER MENU, ADVANCED MENU; set to "RECORD AT POWER UP".
"Recording at varying times"	Check that the TIMER RECORDING MENU settings are correct or Timer Recording is disabled.
"The recorded picture is grainy"	Improve the light level to the camera, or increase the exposure level; use a camera which works to a lower lux level.
"X200 has all front panel LED's illuminated and fails to operate"	Ensure cartridge is pushed home and switched on.
"Cameras connected but no live views"	Press "Auto" on the X201 Reviewer.
"No picture on X201 monitor"	Ensure that correct power supply to X200 (12V +/- 1.2V, 2A (continuous) 3A (peak).
"PC can't see disk but recordings viewable on X200"	The hard disk boot / partition / FAT sectors may have become corrupted. Go to OTHER MENU, FILE SYTEM, FILE SYSTEM CHECK MENU and select PERFORM CHECK AND CORRECT NOW. This checks and rewrites the boot, partition and FAT sectors of the hard disk and removes any corrupted recording files. **Please also check the shock and vibration damping of the X200 as shock and vibration reduce disk life and can also lead to corruptions on the hard disk.**

USB Interface Kit

"PC fails to start if USB Interface Kit and cartridge is attached but switched off during start up"

On some PC's Windows may not start correctly if an X200 cartridge is left attached to the PC via the USB Interface Kit during start up. This may be the case even if the cartridge is switched off.

"Hard Disk Cartridge appears to be full When trying to save X200 software from a PC Running Windows 98"

If the hard disk cartridge has V1.51 of the X100 operating system installed on it then although it may have enough free space available to save the X200 .xos file Windows 98 shows the disk as full.

- Connect the cartridge to the PC via the USB Interface Kit.
- Go to My Computer and right click on the Cartridges drive letter.
- Select 'Properties'.
- Select 'Tools'.
- Select error-checking status 'check now'.
- Select type of test as 'Standard'.
- Select 'Start'.
  The scan disk process will detect the following errors: - 'System_b' and 'System' with the option to 'repair the error'
- Select 'OK'
  The scandisk will then detect that the information on the disk can be damaged with the option to repair the error.
- Select 'OK'
  Scandisk will then show the results from scanning the cartridge.
- Select 'Close'

The cartridge will now allow the user to transfer X200 software onto the cartridge.

USB Interface Kit compatibility with Windows XP

Early versions of Windows XP may have some compatibility problems when used with USB2 interfaces such as the USB Interface Kit supplied to connect an X200 Hard Disk Cartridge to a PC. This situation has been resolved with the issue of service pack 1 for Windows XP.

If you are having trouble installing and using the USB Interface Kit with Windows XP then check to see if service pack 1 has been installed (My Computer > View System Information > General Tab). If it is not listed under the System heading, then it may not have been installed and can be downloaded from Microsoft.